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VISIBILITY TESTS OF 1978 MODEL CARS

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Phoenix, Arizona 85027

Contract No. DOT HS-8-01967
Contract Amt. $29,028

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SEPTEMBER 1978
FINAL REPORT

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16. Abstract

The purpose of this project was to provide the National Highway Traffic Safety Administration (NHTSA) with quantitative visibility data on current model cars which the NHTSA can analyze for a future Notice of Proposed Rulemaking on "Fields of Direct View." Twenty models were measured for the size of "A" pillar obstruction using binocular testing techniques. Monocular measurements were taken from two eye reference points in the forward 180 degrees and in the rear right quadrant of the vehicle using the test procedures described in the contract work statement. In addition, scale drawings were prepared showing the windshield, the viewing area specified in the work statement, and the relationship of this area to the wiper area requirements as specified by FMVSS No. 104, "Windshield Wiping and Washing Systems."

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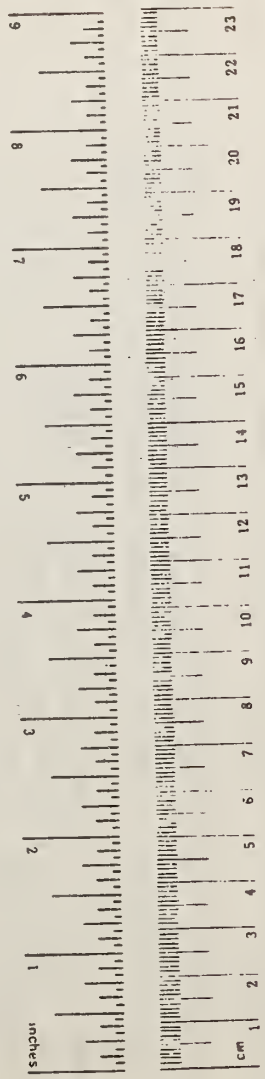
METRIC CONVERSION FACTORS

Approximate Conversions to Metric Measures

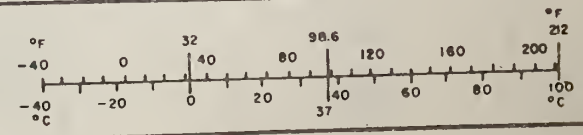
Symbol	When You Know	Multiply by	To Find	Symbol
		LENGTH		
in	inches	*2.5	centimeters	cm
ft	feet	30	centimeters	cm
yd	yards	0.9	meters	m
mi	miles	1.6	kilometers	km
		AREA		
in^2	square inches	6.5	square centimeters	cm^2
ft^2	square feet	0.09	square meters	m^2
yd^2	square yards	0.8	square meters	m^2
mi^2	square miles	2.6	square kilometers	km^2
	acres	0.4	hectares	ha
		MASS (weight)		
oz	ounces	28	grams	g
lb	pounds	0.45	kilograms	kg
	short tons (2000 lb)	0.9	tonnes	t
		VOLUME		
tsp	teaspoons	5	milliliters	ml
Tbsp	tablespoons	15	milliliters	ml
fl oz	fluid ounces	30	milliliters	ml
c	cups	0.24	liters	l
pt	pints	0.47	liters	l
qt	quarts	0.95	liters	l
gal	gallons	3.8	liters	l
ft^3	cubic feet	0.03	cubic meters	m^3
yd^3	cubic yards	0.76	cubic meters	m^3
		TEMPERATURE (exact)		
°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C

*1 in = 2.54 (exactly). For other exact conversions and more detailed tables, see NBS Misc. Publ. 286, Units of Weights and Measures, Price $2.25, SD Catalog No. C13.10:286.



Approximate Conversions from Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
		LENGTH		
mm	millimeters	0.04	inches	in
cm	centimeters	0.4	inches	in
m	meters	3.3	feet	ft
m	meters	1.1	yards	yd
km	kilometers	0.6	miles	mi
		AREA		
cm^2	square centimeters	0.16	square inches	in^2
m^2	square meters	1.2	square yards	yd^2
km^2	square kilometers	0.4	square miles	mi^2
ha	hectares (10,000 m^2)	2.5	acres	
		MASS (weight)		
g	grams	0.035	ounces	oz
kg	kilograms	2.2	pounds	lb
t	tonnes (1000 kg)	1.1	short tons	
		VOLUME		
ml	milliliters	0.03	fluid ounces	fl oz
l	liters	2.1	pints	pt
l	liters	1.06	quarts	qt
l	liters	0.26	gallons	gal
m^3	cubic meters	35	cubic feet	ft^3
m^3	cubic meters	1.3	cubic yards	yd^3
		TEMPERATURE (exact)		
°C	Celsius temperature	9/5 (then add 32)	Fahrenheit temperature	°F



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1.0 INTRODUCTION

The purpose of this project was to provide the National Highway Traffic Safety Administration (NHTSA) with quantitative visibility data on current model cars which the NHTSA can analyze for a future Notice of Proposed Rulemaking on "Fields of Direct View." Twenty models were measured for the size of "A" pillar obstruction using binocular testing techniques. Monocular measurements were taken from two eye reference points in the forward 180 degrees and in the rear right quadrant of the vehicle using the test procedures described in the contract work statement (included herein in Appendix A). In addition, scale drawings were prepared showing the windshield, the viewing area specified in the work statement, and the relationship of this area to the wiper area requirements as specified by FMVSS No. 104, "Windshield Wiping and Washing Systems."

Three of the models to be tested were deleted for various reasons, i.e., the AMC Matador, Chevrolet Monza, and Dodge Challenger. With the Contract Technical Manager's approval, the Chevrolet Malibu Wagon, Buick Skyhawk, and Plymouth Horizon were substituted. Complete data on each of the twenty models tested is shown in Appendixes B through E.

2.0 FACILITY DESCRIPTION

To minimize setup time for each test, a permanent reference system was constructed first, and then each vehicle was properly positioned within this system. The sighting equipment was also positioned relative to the reference system, reducing the number of measurements required for each car.

The reference system consists of a longitudinal centerline permanently marked on a level plate and a forward reference station having horizontal and vertical scales located in a plane perpendicular to the plate centerline. The horizontal scale gives the lateral distance from the plate centerline and the vertical scale gives the height above the plate. To aid in positioning the sighting equipment, a reference line was drawn 45 inches from and parallel to the plate centerline.

The sighting equipment consists of a crossbar and supports, three sets of mounting plates, and an optical reading transit (theodolite) (see Figures 1 and 2). The crossbar supports the sighting apparatus at the required position relative to the vehicle reference planes. The positioning plates support the theodolite at the prescribed location for monocular, binocular, and viewing area measurements.

The crossbar passes through the side windows of the vehicle and is supported at each end by a vertical stand. An adjustor is provided on each stand to level or change the height of the crossbar. Once in the correct position, the crossbar is clamped to the stands, providing a stable sighting platform.

Four positioning plates were fabricated to correctly position the theodolite sight tube at the monocular (V_1 and V_2) and binocular eye points. These plates are mounted on spacers above the crossbar. Thus, when the V_2 plate is mounted on the crossbar it will position the theodolite at the V_2 elevation (Figure 3). The

Figure 1. Typical Vehicle Setup for Measurements.

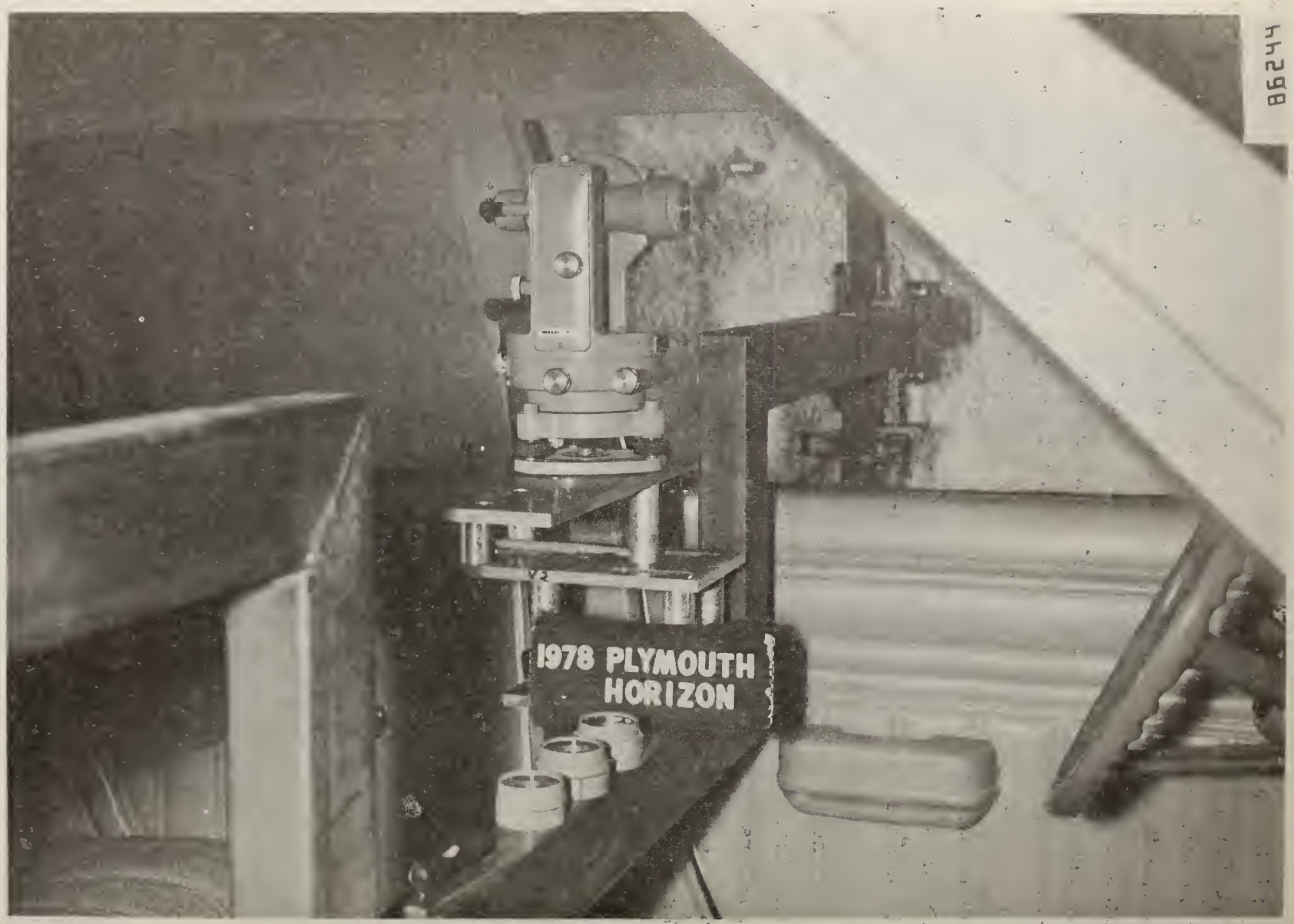

Figure 2. Instrument Setup for Monocular Obstruction Angle Measurement at V_1.

V_2 plate can be adjusted in the X (longitudinal) direction to correct for seat back angle and H point travel. The V_1 plate (Figure 4) mounts on the V_2 plate and raises the theodolite three inches to the V_1 height. The V_1 plate has three additional mounting holes spaced laterally 3, 6, and 9 inches from the V_1 position. The theodolite is placed in these holes to project points in a horizontal line on the windshield in order to lay out the prescribed view areas. For binocular measurements, the theodolite can be mounted in each of the eye reference points on the E plate (Figures 5 and 6). The E plate can be fixed parallel to the vehicle centerline or rotated about one of two pivot points.

The theodolite has 360° horizontal and vertical circles with a maximum reading error of one-half minute. Due to the cramped quarters in some vehicles, a 60° eye piece was used. Four short focus objective lenses were also required to focus on the close obstructions.

Figure 3. Monocular Obstruction Angles: Plate Configuration for Locating Telescope Sight Tube at V_2.

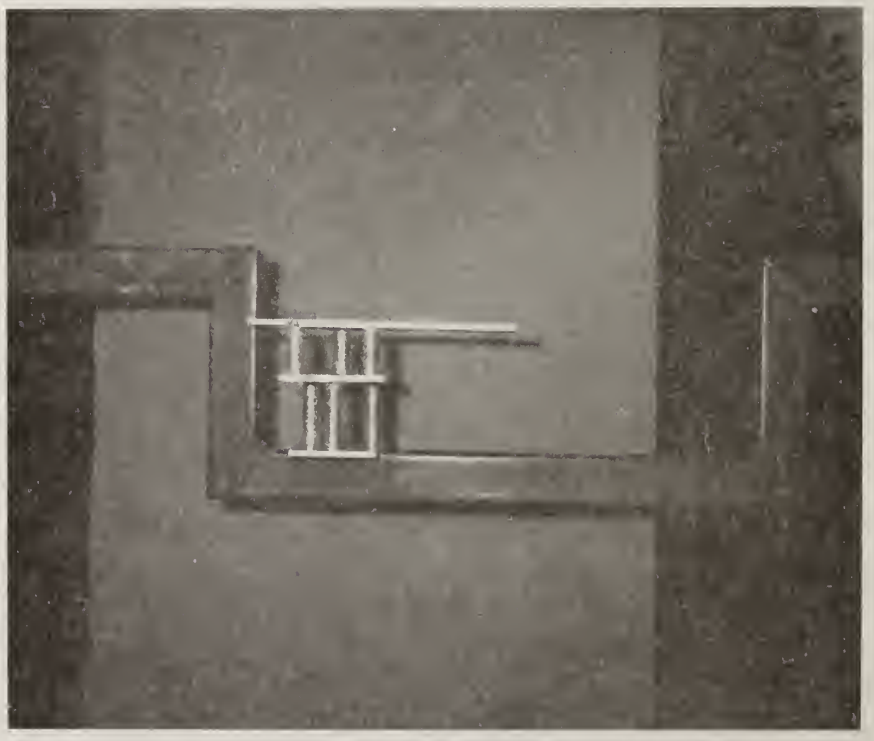

Figure 4. Monocular Obstruction Angles: Plate Configuration for Locating Telescope Sight Tube at V_1.

Figure 5. Binocular Obstruction Angle: Plate Configuration for Measurement of Binocular Obstruction Angles From P_1.

Figure 6. Binocular Obstruction Angle: Plate Configuration for Measurement of Binocular Obstruction Angles From P_2.

3.0 PROCEDURAL HIGHLIGHTS

Prior to testing, manufacturers' data on each vehicle was obtained. This data included design load attitude, location of body reference planes, seat travel, seat back angle, and location of the seating reference point (SRP). From this data, the coordinates of the R (reference) point were computed.

The front seats were removed to allow for installation of the test equipment. All mirrors were adjusted to normal viewing position, all openings except front windows were closed, the sun visor was stored, and the steering wheel (if adjustable) was placed in its lowest position.

The vehicle was then positioned for testing. The vehicle centerline was placed directly over the plate centerline. The attitude of the vehicle was adjusted (using screw jacks) to the manufacturer's specifications. The locations of vehicle fiducial points or frame rail gauge holes were projected downward and marked on the level plate. A measurement was also made from a vehicle fiducial mark to locate the longitudinal position of the SRP.

The crossbar was positioned over a lateral line through the R-point which is based on the SRP but adjusted laterally according to the position of the SAE J941 X-Y locator line using plumb bobs. The bar was adjusted laterally so that the R-point was the correct distance from the vehicle centerline. Finally, the height of the crossbar was adjusted by mounting the theodolite on the V_2 plate and changing the elevation to the proper reading on the vertical scale on the reference station. After height adjustments were made, the fixture setup was complete. In general the crossbar was setup to be properly positioned for binocular measurements, A counter adjustement for changes in the longitudinal position was built into the V_2 plate for monocular measurements.

The horizontal circle of the theodolite was set to zero with the sight tube pointed forward parallel to the vehicle centerline. The theodolite's position was adjusted for each series of measurements by attaching the proper mounting plate. The detailed measurement procedure is given in Appendix A.

4.0 SUMMARY OF RESULTS

Table 1 provides a summary of the monocular and binocular obstruction angles obtained (by zone) on each vehicle. Note that the inside rear view mirror occasionally appears as an obstruction in Zone II at the V_1 elevation.

Table 2 gives the average obstruction angle and the maximum angle for each zone. Complete data is provided in Appendixes B through E. Zone II angles varied greatly depending on how much, if any, of the rear view mirror was visible. To get a meaningful Zone II average, the mirror is not included in the Table 2 data. In some cases, the maximum obstruction angle differed significantly from the average. An explanation for these differences is given in the following paragraphs.

The Fiesta was the only vehicle with front window dividers which reduced its Zone I and II visibility by 3-1/2° and 1-1/2°, respectively.

The wide "B" pillar of the Concord (due to the small rear side window option), combined with the small size of the car, gave it the greatest Zone IV monocular obstruction angle.

The lack of rear side windows (optional) gives the LTD-II the largest combined "C" pillar obstruction angle (average of V_1 and V_2).

Because of its trapezoidal shape, the Gremlin's "C" pillar gave the largest single obstruction at the V_2 elevation.

The left "A" pillar of the Arrow was very close to the V_1 eye point because of its large rearward slope. Other small vehicles, such as the Skyhawk, Concord, Gremlin, and Fiesta, had larger than average Zone I and II obstruction angles because of the short distance between the V and E points and the "A" pillars.

TABLE 1. MONOCULAR AND BINOCULAR OBSTRUCTION ANGLES BY ZONE

	Vehicle Body Style	Seat Type	Vehicle Load For Attitude Determination	Monocular Obstruction V_1 Zone I	Monocular Obstruction V_1 Zone II	Monocular Obstruction V_1 Zone IV	Monocular Obstruction V_2 Zone I	Monocular Obstruction V_2 Zone II	Monocular Obstruction V_2 Zone IV	Binocular Obstruction Left "A"	Binocular Obstruction Right "A"
T-Bird	2-Door	Bucket	Full Passenger Plus Luggage	9°13'	29°29'*	26°52'	7°20'	4°27'	27°54'	1°42'	2°19'
Fairmont	2-Door Sedan	Base Bench	Full Passenger Plus Luggage	10°18'	5°25'	12°03'	8°32'	5°13'	12°00'	4°09'	2°56'
LTD	4-Door Pillared Hardtop	Bench	Full Passenger Plus Luggage	8°15'	28°16'*	20°35'	7°02'	4°50'	21°03'	2°43'	2°47'
LTD-II	2-Door Hardtop	Flight Bench	Full Passenger Plus Luggage	9°00'	30°31'*	15°55'	7°15'	4°30'	15°43'	1°37'	2°35'
Fiesta	2-Door Sedan	Base Bucket	Full Passenger Plus Luggage	13°35'	26°54'*	13°20'	11°30'	7°58'	12°49'	3°51'	4°48'
Regal	2-Door Sport Coupe	Manual Bucket	Curb Weight	8°33'	5°14'	18°58'	7°19'	4°34'	19°28'	3°32'	2°36'
Caprice	4-Door Sedan	Manual Bench	Curb Weight	7°40'	5°08'	20°12'	6°29'	4°38'	20°58'	3°13'	2°51'
Skyhawk	2-Door Hatchback	Bucket	Curb Weight	10°49'	30°29'*	21°46'	9°07'	6°26'	18°24'	4°54'	4°15'
Camaro	2-Door Sport Coupe	Bucket	Curb Weight	8°36'	26°39'*	15°07'	7°12'	3°57'	14°37'	2°33'	1°36'

*Includes all or part of the width of the inside rear view mirror.

TABLE 1. MONOCULAR AND BINOCULAR OBSTRUCTION ANGLES BY ZONE (CONTD)

	Vehicle Body Style	Seat Type	Vehicle Load For Attitude Determination	Monocular Obstruction V_1 Zone I	Monocular Obstruction V_1 Zone II	Monocular Obstruction V_1 Zone IV	Monocular Obstruction V_2 Zone I	Monocular Obstruction V_2 Zone II	Monocular Obstruction V_2 Zone IV	Binocular Obstruction Left "A"	Binocular Obstruction Right "A"
Chevette	4-Door Hatchback Sedan	Bucket	Curb Weight	8°48'	5°35'	20°48'	7°40'	5°30'	20°27'	4°06'	3°03'
Corvette	2-Door Coupe	Bucket	Curb Weight	7°28'	4°28'	13°53'	6°08'	4°05'	13°40'	1°15'	1°28'
Malibu	4-Door Station Wagon	Bench	Curb Weight	10°03'	5°24'	15°35'	7°59'	4°51'	15°08'	4°52'	3°00'
Cordoba	2-Door Specialty Hardtop	Manual Bench	**	8°47'	12°12'*	18°56'	6°59'	4°37'	19°23'	2°43'	2°41'
Volare	2-Door Coupe	Manual Bench	**	8°14'	33°29'	23°14'	6°30'	4°26'	19°02'	1°12'	2°17'
Diplomat	4-Door Sedan	Manual Bench	Passengers, No Luggage	8°20'	5°13'	20°15'	6°58'	4°59'	19°48'	3°29'	2°47'
Arrow	2-Door Hatchback Coupe	Bucket	Passengers, No Luggage	12°56'	29°30'*	17°38'	9°29'	7°19'	18°27'	7°40'	5°29'
Horizon	4-Door Hatchback Sedan	Low Back Bucket	Passengers, No Luggage	9°17'	6°10'	21°00'	7°53'	5°48'	21°03'	4°49'	3°36'

**These two cars were measured with the Zero Z plane level. When loaded with passengers but no luggage, the Zero Z plane is pitched up 0°39' for the Cordoba and 0°13' for the Volare.

TABLE 1. MONOCULAR AND BINOCULAR OBSTRUCTION ANGLES BY ZONE (CONTD)

	Vehicle Body Style	Seat Type	Vehicle Load For Attitude Determination	Monocular Obstruction V_1 Zone I	Monocular Obstruction V_1 Zone II	Monocular Obstruction V_1 Zone IV	Monocular Obstruction V_2 Zone I	Monocular Obstruction V_2 Zone II	Monocular Obstruction V_2 Zone IV	Binocular Obstruction Left "A"	Binocular Obstruction Right "A"
Gremlin	2-Door Custom	Bench	4 Occupants = 600 Luggage = 175	9°55'	25°54'*	21°37'	8°13'	5°58'	25°58'	5°12'	5°05'
Concord	2-Door D/L Coupe	Bucket	4 Occupants = 600 Luggage = 175	10°36'	33°36'*	29°08'	8°36'	6°27'	30°11'	5°41'	4°13'
Pacer	2-Door D/L Coupe	Bucket	4 Occupants = 600 Luggage = 175	9°31'	7°00'	20°25'	7°49'	4°59'	19°36'	3°58'	3°02'

TABLE 2. AVERAGE OBSTRUCTION ANGLE AND MAXIMUM OBSTRUCTION FOR EACH ZONE

Type of Measurement	Obstruction	Elevation	Average Obstruction Angle	Maximum Obstruction Angle	Vehicle With Maximum Obstruction Angle
Monocular	Zone I	V1	9-1/4°	13° 35'	Fiesta
		V2	7-3/4°	11° 30'	Fiesta
	Zone II (without mirror)	V1	5-3/4°	8° 59'	Fiesta
		V2	5-1/4°	7° 55'	Fiesta
	Zone IV	V1	19-3/4°	29° 08'	Concord
		V2	19-3/4°	30° 11'	Concord
	Right "C" Pillar	V1	14-1/2°	19° 38'	LTD-II
		V2	14-1/2°	21° 32'	Gremlin
Binocular	Left "A" Pillar	-	3-3/4°	7° 40'	Arrow
	Right "A" Pillar	-	3-1/4°	5° 29'	Arrow

The Thunderbird without rear side windows (optional) also exhibited a large monocular obstruction angle in Zone IV.

The V_1 measurements for the "C" pillar of the Volare, Skyhawk, and Arrow passed through the upper edge of the rear side windows instead of the front edge of the "C" pillar as on most cars. This is because of the shape of the rear side window as can be seen in the photographs in the appropriate appendixes.

For the Corvette, sides "a" and "f" of the viewing area did not lie on the windshield. To obtain the largest possible viewing area within the windshield boundaries, side "a" was drawn at 14° 37' counterclockwise (instead of 17°) and side "f" at 2° 13' down (instead of 3°).

APPENDIX A

DETAILED TEST PROCEDURES

TDR No. 78-9C
July 1978

Project 3043

APPENDIX A1

TEST PLAN FOR VEHICLE VISIBILITY MEASUREMENT PROCEDURE

- GENERAL MOTORS VEHICLES -

Prepared by:

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VEHICLE VISIBILITY MEASUREMENT PROCEDURE

A. VEHICLE SETUP

1. Fill out data sheet No. 1.

2. Clean the windshield.

3. Place the front seat in the full rear position and locate the approximate SRP. Mark this location on the door sills.

4. Remove seats from the automobile.

5. Locate points on front and rear bumpers which lie on the vehicle longitudinal centerline using symmetrical properties of vehicle design (will be verified in step 12).

6. Align vehicle on level plate such that:

   a. The approximate SRP is over the level plate lateral reference line.

   b. The centerline of the car (indicated by marks on the bumper) is directly over the level plate longitudinal reference line.

7G. Reserved.

8G. Reserved.

9G. Measure rearward from the front axle centerline parallel to vehicle centerline and locate master control reference point longitudinal station locations on level plate.

10. Position screw jacks under vehicle.

11. Using the jacks, adjust the elevation of the body so that the heights of the master control reference points above the plate are the values shown in the last two columns of Table A1-1.

12. Verify that vehicle centerline is directly over the plate centerline.

    NOTE: If vehicle attitude changes significantly, steps 4 through 9 may have to be repeated.

13G. Reserved.

TABLE A1-1. VEHICLE REFERENCE ATTITUDE FOR GENERAL MOTORS PRODUCTS (CURB WEIGHT DIMENSIONS)

Dimension I.D.	A	B	J	K
Reference Point Location	Rearward From Centerline Front Axle to Rocker Panel	Forward From Centerline Rear Axle to Rocker Panel	Rocker Panel to Ground at "A"	Rocker Panel to Ground at "B"
Regal	24.53 in. (623)	20.94 in. (532)	9.80 in. (249)	9.80 in. (249)
Caprice	31.50 in. (800)	24.61 in. (625)	10.51 in. (267)	10.63 in. (270)
Skyhawk	26 in.	16 in.	7.75 in.	7.75 in.
Camaro	36.3 in.	20.0 in.	8.2 in.	7.85 in.
Chevette	36.02 in. (915)	18.86 in. (479)	9.02 in. (229)	8.86 in. (225)
Corvette	30.5 in.	24 in.	8.68 in.	8.57 in.
Malibu	24.53 in. (623)	20.94 in. (532)	9.96 in.	10.28 in.

14G. Measure back from the forward front seat anchorage hole and locate the longitudinal station of the SRP (both sides) shown in the table included in Figure A1-1.

15G. Correct the measurement in step 14 using the value shown in Column 3, Table A1-2 (both sides). Mark these points on the level plate.

16G. Lay out a lateral line on the horizontal plate through the points determined in step 15.

17. Place the crossbar support stands at approximately the proper locations so that the front edge of the crossbar will be directly over the line in step 16. Adjust the stands so that they are vertical and stable. Sandbag in place.

18. Place the crossbar through the vehicle windows.

19. Measure along the crossbar to the right of point A' a distance equal to that in Column 4 of Table A1-2.

20. Position the crossbar on the stands so that the point marked in step 19 is directly over the 45-inch reference line on the level plate.

21. Install V_2 plate on the crossbar and position the plate longitudinally using the correction value in Column 5 of Table A1-2.

22. Mount the theodolite on the V_2 plate. Level the theodolite and adjust the vertical angle to 90°.

23. View the vertical scale on the reference station in front of the vehicle and adjust height of crossbar to the value shown in Column 6 of Table A1-2. Verify that the crossbar is still horizontal after this adjustment and that it is still over the line determined in step 16.

NOTE: After completion of step 23, the vehicle and fixture are ready for the measurements.

Vehicle	Seating Position: Outboard	Seating Position: Center	Dimension A (in.)	Dimension B (in.)	Dimension C (in.)	Dimension D (in.)	Torso Line Angle
Buick Skyhawk	X		14.32	7.1	9.29	.14	26°
Buick Regal Coupe and Chevrolet Mailbu Wagon	X		13.70	7.83	9.69	1.40	26.5°
Chevrolet Caprice	X		13.56	7.89	17.66	1.24	26.5°

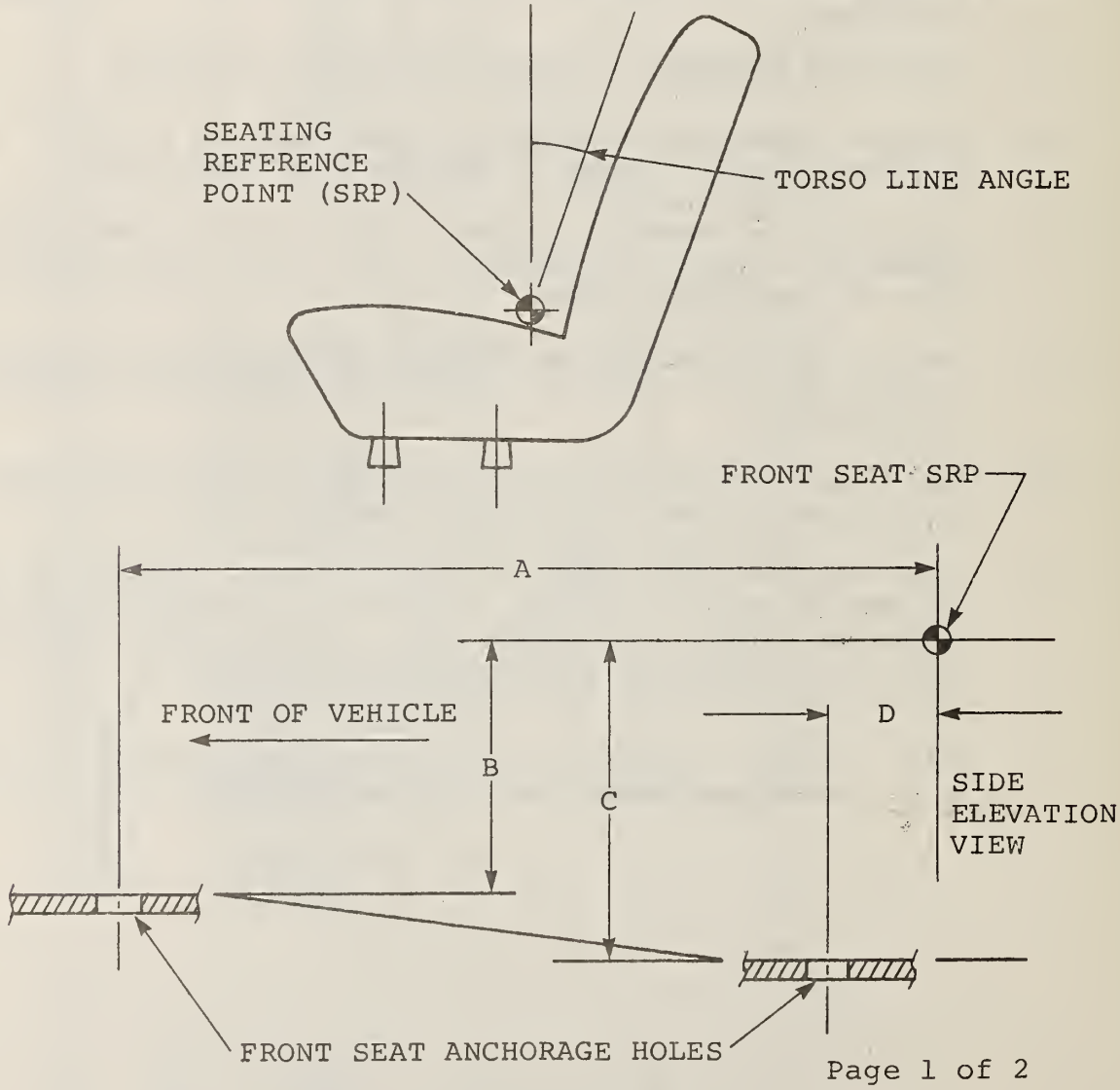

Figure A1-1. SRP Location Dimensions.

Vehicle	Seating Position		Dimension				Torso Line Angle
	Outboard	Center	A (in.)	B (in.)	C (in.)	D (in.)	
Camaro	X		15.15	6.4	8.5	.07	26°
Corvette	X		13.77	4.25	5.5	5.36	33°
Chevette	X		14.49	8.23	8.74	0.20	26.5°

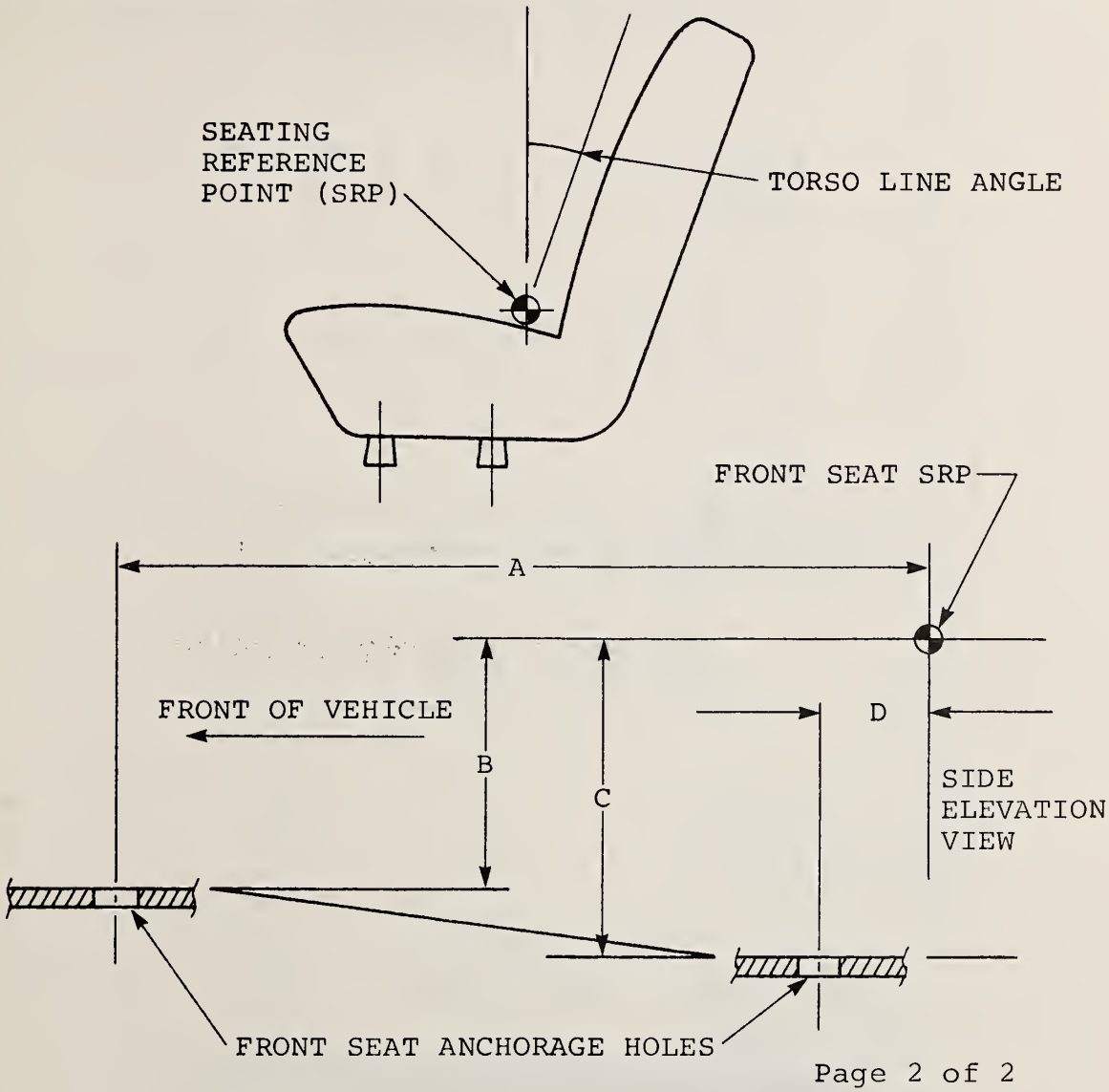

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Figure A1-1 (Contd). SRP Location Dimensions.

TABLE A1-2. DIMENSIONAL DATA: GENERAL MOTORS VEHICLES

Vehicle	Column 1 Distance From Zero X Plane to Master Control Notch	Column 2 L31 Distance From Zero X Plane to Y-Z Plane (SRP)	Column 3 PX*	Column 4 Lateral Distance From Zero Y Plane to the R Point	Column 5 Counter-Correction for V Plates**	Column 6 Height of V_2 Above Ground	Column 7 Lateral Distance of V_2 From Zero Y Plane	Column 8 Height of V_1 Above Ground	Column 9 Lateral Distance of V_1 From Zero Y Plane
Camaro			-0.54	15.49	+0.88	40.43	15.69	43.43	15.69
Corvette			+1.39	13.25	+1.26	37.94	13.45	40.94	13.45
Skyhawk			-1.30	13.15	+1.64	40.93	13.35	43.39	13.35
Chevette			-0.20	13.15	+0.88	42.32	13.35	45.32	13.35
Regal			-1.21	16.01	+1.89	44.20	16.21	47.20	16.21
Caprice			-0.96	16.95	+1.64	43.82	17.15	46.82	17.15
Malibu			-1.55	16.01	+1.89	44.58	16.21	47.58	16.21

*+ means add to L31, - means subtract from L31.
**+ means move rearward, - means move forward.

TDR No. 78-9A
June 1978

Project 3043

APPENDIX A2

TEST PLAN FOR VEHICLE VISIBILITY MEASUREMENT PROCEDURE

- FORD VEHICLES -

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VEHICLE VISIBILITY MEASUREMENT PROCEDURE

A. VEHICLE SETUP

1. Fill out data sheet No. 1.

2. Clean the windshield.

3. Place the front seat in the full rear position and locate the approximate SRP. Mark this location on the door sills.

4. Remove seats from the automobile.

5. Locate points on front and rear bumpers which lie on the vehicle longitudinal centerline using symmetrical properties of vehicle design (will be verified in step 12).

6. Align vehicle on level plate such that:

   a. The approximate SRP is over the level plate lateral reference line.

   b. The centerline of the car (indicated by marks on the bumper) is directly over the level plate longitudinal reference line.

7F. Drop a plumb bob from each master control notch to indicate the longitudinal ("X") and lateral ("Y") position of the notch and mark this point on the level plate (both sides of the vehicle).

8F. Measure forward from the points in step 6 and locate the Zero X plane. Mark this point on the level plate (both sides).

9F. Measure rearward from the Zero X plane parallel to vehicle centerline and locate master control reference point longitudinal station locations on level plate.

10. Position screw jacks under vehicle.

11. Using the jacks, adjust the elevation of the body so that the heights of the master control reference points above the plate are the values shown in the last column of Table A2-1.

12. Verify that vehicle centerline is directly over the plate centerline.

    NOTE: If vehicle attitude changes significantly, steps 4 through 9 may have to be repeated.

TABLE A2-1. 1978 MASTER CONTROL SECTION REFERENCE POINTS[1]
(ATTACHMENT II-b IN FORD PACKAGE)

Carline	BEPEO Master Control Section Drawing Number	Attachment	Cross Section at This Inch Line X[2] (in.)	Y[3] (in.)	Z[4] (in.)	Height Above Ground (at design load)
1. Thunderbird 2-door	D20B-6510130-Z3	III-a-2	20.00	-32.850	1.390	11.586
	D20B-5310130-Z1	III-a-3	70.00	±32.690	1.030	11.094
2. Fairmont 2-door Sedan	D8BB-5400001-Z1 (Sheet #3)	III-b-1	17.50	-29.720	-1.340	10.660
	D8BB-5400001-Z1 (Sheet #2)	III-b-2	64.00	±29.450	-1.830	10.170*
3. LTD 4-door	D3AB-6510130-Z2	III-c-2	15.00	-33.850	0.430	11.037
	D3AB-5310128-Z3	III-c-3	69.00	±33.850	0.105	10.618
4. LTD-II 2-door With Sports Touring Package	D20B-6510130-Z3	III-a-2	20.00	-32.850	1.390	11.356
	D20B-5310130-Z2	III-a-3	70.00	±32.690	1.030	10.952
5. Fiesta		II-d	17.717 (450mm)	27.008 (686mm)	-0.433 (11.0mm)	10.629 (270)
			47.244 (1120mm)	27.008 (686mm)	-0.650 (16.5mm)	10.543 (268)

(1) Coordinates given with respect to the body grid reference system which is a right-handed, Cartesian reference system, with the +Z-axis pointing in an upward direction.
(2) Measured longitudinally from the Zero X plane.
(3) Measured laterally from the Zero Y plane.
(4) Measured vertically from the Zero Z plane.
*The station at 64.00 inches is inside the vehicle wall. Take measurement to 61.2 inches and linearly interpolate from values given for 64.00 and 17.50. Height then is 10.200 inches.

13F. Construct diagonals from LF to RR and RF to LR master control reference points and verify that the intersection is on the plate centerline.

14F. Measure back from the Zero X plane and locate the longitudinal station of the SRP (both sides) shown in Column 2, Table A2-2.

15F. Correct the measurement in step 14 using the value shown in Column 3, Table A2-2 (both sides). Mark these points on the level plate.

16F. Lay out a lateral line on the horizontal plate through the points determined in step 15.

17. Place the crossbar support stands at approximately the proper locations so that the front edge of the crossbar will be directly over the line in step 16. Adjust the stands so that they are vertical and stable. Sandbag in place.

18. Place the crossbar through the vehicle windows.

19. Measure along the crossbar to the right of point A' a distance equal to that in Column 4 of Table A2-2.

20. Position the crossbar on the stands so that the point marked in step 19 is directly over the 45-inch reference line on the level plate.

21. Install V_2 plate on the crossbar and position the plate longitudinally using the correction value in Column 5 of Table A2-2.

22. Mount the theodolite on the V_2 plate. Level the theodolite and adjust the vertical angle to 90°.

23. View the vertical scale on the reference station in front of the vehicle and adjust height of crossbar to the value shown in Column 6 of Table A2-2. Verify that the crossbar is still horizontal after this adjustment and that it is still over the line determined in step 16.

NOTE: After completion of step 23, the vehicle and fixture are ready for measurements.

TABLE A2-2. DIMENSIONAL DATA: FORD MOTOR COMPANY VEHICLES

Vehicle	Column 1 Distance From Zero X Plane to Master Control Notch	Column 2 L31 Distance From Zero X Plane to Y-Z Plane (SRP)	Column 3 PX*	Column 4 Lateral Distance From Zero Y Plane to the R Point	Column 5 Counter-Correction for V Plates**	Column 6 Height of V_2 Above Ground	Column 7 Lateral Distance of V_2 From Zero Y Plane	Column 8 Height of V_1 Above Ground	Column 9 Lateral Distance of V_1 From Zero Y Plane
T-Bird	+18.75	42.85	-0.58	-16.34	+1.26	42.31	-16.54	45.31	-16.54
Fairmont	+17.50	40.71	-1.26	-15.10	+1.26	42.04	-15.30	45.04	-15.30
LTD	+29.50	42.94	-0.58	-17.57	+1.26	43.51	-17.77	46.51	-17.77
LTD-II	+18.75	42.85	-0.58	-16.34	+1.26	42.12	-16.54	45.12	-16.54
Fiesta		40.90	-1.22	-12.00	+0.88	42.24	-12.20	45.24	-12.20

*+ means add to L31, - means subtract from L31.
**+ means move rearward, - means move forward.

APPENDIX A3

TEST PLAN FOR VEHICLE VISIBILITY MEASUREMENT PROCEDURE

- CHRYSLER VEHICLES -

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VEHICLE VISIBILITY MEASUREMENT PROCEDURE

A. VEHICLE SETUP

1. Fill out data sheet No. 1.

2. Clean the windshield.

3. Place the front seat in the full rear position and locate the approximate SRP. Mark this location on the door sills.

4. Remove seats from the automobile.

5. Locate points on front and rear bumpers which lie on the vehicle longitudinal centerline using symmetrical properties of vehicle design (will be verified in step 12).

6. Align vehicle on level plate such that:

   a. The approximate SRP is over the level plate lateral reference line.

   b. The centerline of the car (indicated by marks on the bumper) is directly over the level plate longitudinal reference line.

7C. Locate the front gauge holes located in the transmission crossmember and the rear gauge holes located in the rear longitudinals. Table A3-1 gives the approximate distance from the front wheel centerline to the gauge holes.

8C. Place a trammel with cone locators in the front gauge holes and project a lateral line through the gauge holes to points on the rocker panel on both sides of the vehicle.

9C. Repeat step 8 for the rear gauge holes.

10C. Construct diagonals from LF to RR and RF to LR gauge holes and verify that the intersection is on the plane centerline.

11. By means of screw jacks, adjust the elevation of the vehicle body at the gauge holes to the dimension H shown in Table A3-1.

12. Recheck the vehicle centerline alignment with the level plate longitudinal reference line and repeat paragraphs 6 through 11 as necessary to ensure proper longitudinal alignment and elevation.

TABLE A3-1. CORDOBA, VOLARE, DIPLOMAT, ARROW, AND HORIZON DIMENSIONAL DATA

	Front Gauge Holes					Rear Gauge Holes				
	Approximate Distance to Front Wheel Centerline	Distance From Body Reference Planes			Height* (Above Ground)	Approximate Distance to Front Wheel Centerline	Distance From Body Reference Planes			Height** (Above Ground)
		X	Y	Z*			X	Y	Z**	
Cordoba	41.5	+25.1	±18.75	-6.75	5.97	86.0	69.7	±18.8	-6.86	5.36
Volare	36.5	21.2	±16.25	-5.63	7.04	83.0	67.7	±17.6	-6.74	5.75
Diplomat	36.5	21.2	±16.25	-5.63	7.04	87.0	71.7	±17.6	-6.74	5.75
Arrow***	0.8	0.8	±13.43	+4.17	12.03	115.6	115.6	±18.9	+6.38	13.02
Horizon	26.0	29.5	±16.30	-1.20	5.49	119.1	122.6	±19.76	+5.70	13.80

*From bottom surface of crossmember (front longitudinals on Horizon).
**From bottom surface of longitudinal.
***NOTE: The fiducial points for the Arrow were not distinctively described but were given as points on the vehicle at the following locations:

Front: 0.8 inch rearward of the front axle and ±13.43 inches from vehicle centerline. Height at curb weight is 13-5/8 inches.

Rear: 23.47 inches rearward of the rear axle and ±18.9 inches from the vehicle centerline. Height at curb weight is 15.2 inches.

13. Establish the Zero X plane by measuring forward from the lateral line established in step 8 for the distance "X" shown for the front gauge holes in Table A3-1.

14. Measure back from the Zero X plane and locate the longitudinal station of the SRP (both sides) shown in Column 2, Table A3-2.

15. Correct the measurement in step 14 using the value shown in Column 3, Table A3-2 (both sides). Mark these points on the level plate.

16. Lay out a lateral line on the horizontal plate through the points determined in step 15.

17. Place the crossbar support stands at approximately the proper locations so that the front edge of the crossbar will be directly over the line in step 16. Adjust the stands so that they are vertical and stable. Sandbag in place.

18. Place the crossbar through the vehicle windows.

19. Measure along the crossbar to the right of point A' a distance equal to that in Column 4 of Table A3-2.

20. Position the crossbar on the stands so that the point marked in step 19 is directly over the 45-inch reference line on the level plate.

21. Install V_2 plate on the crossbar and position the plate longitudinally using the correction value in Column 5 of Table A3-2.

22. Mount the theodolite on the V_2 plate. Level the theodolite and adjust the vertical angle to 90°.

23. View the vertical scale on the reference station in front of the vehicle and adjust height of crossbar to the value shown in Column 6 of Table A3-2. Verify that the crossbar is still horizontal after this adjustment and that it is still over the line determined in step 16.

NOTE: After completion of step 23, the vehicle and fixture are ready for the measurements.

TABLE A3-2. DIMENSIONAL DATA: CHRYSLER CORPORATION VEHICLES

Vehicle	Column 1 Distance From Zero X Plane to Master Control Notch	Column 2 L31 Distance From Zero X Plane to Y-Z Plane (SRP)	Column 3 PX*	Column 4 Lateral Distance From Zero Y Plane to the R Point	Column 5 Counter-Correction for V Plates**	Column 6 Height of V_2 Above Ground	Column 7 Lateral Distance of V_2 From Zero Y Plane	Column 8 Height of V_1 Above Ground	Column 9 Lateral Distance of V_1 From Zero Y Plane
Cordoba	+25.10	46.5	-1.30	-16.09	+1.64	42.07	-16.29	45.07	-16.29
Volare	+21.2	44.1	-1.30	-14.61	+1.64	42.66	-14.81	45.66	-14.81
Diplomat	+21.2	44.1	-1.30	-14.56	+1.64	43.17	-14.76	46.17	-14.76
Arrow***	-	52.9	-2.23	-13.27	+1.89	40.71	-13.47	43.71	-13.47
Horizon	-	55.5	-1.55	-13.84	+1.89	42.37	-14.04	45.37	-14.04

*+ means add to L31, - means subtract from L31.
**+ means move rearward, - means move forward.
***Zero X plane passes through the front axle on this vehicle.

TDR No. 78-9D
June 1978

Project 3043

APPENDIX A4

TEST PLAN FOR VEHICLE VISIBILITY MEASUREMENT PROCEDURE

- AMERICAN MOTORS VEHICLES -

Prepared by:

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VEHICLE VISIBILITY MEASUREMENT PROCEDURE

A. VEHICLE SETUP

1. Fill out data sheet No. 1.

2. Clean the windshield.

3. Place the front seat in the full rear position and locate the approximate SRP. Mark this location on the door sills.

4. Remove seats from the automobile.

5. Locate points on front and rear bumpers which lie on the vehicle longitudinal centerline using symmetrical properties of vehicle design (will be verified in step 12).

6. Align vehicle on level plate such that:

   a. The approximate SRP is over the level plate lateral reference line.

   b. The centerline of the car (indicated by marks on the bumper) is directly over the level plate longitudinal reference line.

7A. Locate the front and rear fiducial marks. Table A4-1 gives the approximate distance from the front wheel centerline to the marks and a description of the location of the marks.

8. Position screw jacks under vehicle.

9. Using the jacks, adjust the elevation of the body so that the heights of the fiducial points above the plate are the values shown in Table A4-1.

10. Recheck the vehicle centerline alignment with the level plate longitudinal reference line and repeat paragraphs 6 through 9 as necessary to ensure proper longitudinal alignment and elevation.

11A. Reserved.

12A. Construct diagonals from LF to RR and RF to LR fiducial marks and verify that the intersection is on the plate centerline.

13A. Establish the Zero X plane by measuring forward from the front fudicial marks the distance shown in Column 1 of Table A4-2.

TABLE A4-1. LOCATION OF FIDUCIAL MARKS

	Front Fiducial Mark*					Rear Fiducial Mark**				
	Approximate Distance to Front Wheel Centerline	Distance From Body Reference Planes			Height Above Ground	Approximate Distance to Front Wheel Centerline	Distance From Body Reference Planes			Height Above Ground
		X	Y	Z			X	Y	Z	
Gremlin	21.68	9.68	26.40	0.80	7.71	76.24	64.24	26.29	-0.10	5.36
Concord	21.68	9.68	26.38	0.80	7.69	81.26	69.26	26.22	-0.08	5.56
Pacer	24.34	10.34	29.88	2.23	7.63	75.65	61.65	29.88	1.58	6.00

*Located at the forward, upper corner of the front 1.51-inch notch (1.31-inch on the Pacer), on the down-flange of the rocker panel.

**Located on the rearward, upper corner of a similar rear notch on the same down-flange of the rocker panel.

TABLE A4-2. DIMENSIONAL DATA: AMERICAN MOTORS VEHICLES

Vehicle	Column 1 Distance From Zero X Plane to Master Fiducial Mark	Column 2 L31 Distance From Zero X Plane to Y-Z Plane (SRP)	Column 3 PX*	Column 4 Lateral Distance From Zero Y Plane to the R Point	Column 5 Counter-Correction for V Plates**	Column 6 Height of V_2 Above Ground	Column 7 Lateral Distance of V_2 From Zero Y Plane	Column 8 Height of V_1 Above Ground	Column 9 Lateral Distance of V_1 From Zero Y Plane
Gremlin	9.68	44.36	-0.54	15.00	+0.88	40.52	15.20	43.52	15.20
Concord	9.68	44.36	-1.22	15.00	+0.88	40.89	15.20	43.89	15.20
Pacer	10.34	45.23	-1.22	15.94	+0.88	41.71	16.14	44.71	16.14

*+ means add to L31, - means subtact from L31.
**+ means move rearward, - means move forward.

14A. Measure back from the Zero X plane and locate the longitudinal station of the SRP (both sides) shown in Column 2, Table A4-2.

15A. Correct the measurement in step 14 using the value shown in Column 3, Table A4-2 (both sides). Mark these points on the level plate.

16A. Lay out a lateral line on the horizontal plate through the points determined in step 15.

17. Place the crossbar support stands at approximately the proper locations so that the front edge of the crossbar will be directly over the line in step 16. Adjust the stands so that they are vertical and stable. Sandbag in place.

18. Place the crossbar through the vehicle windows.

19. Measure along the crossbar to the right of point A' a distance equal to that in Column 4 of Table A4-2.

20. Position the crossbar on the stands so that the point marked in step 19 is directly over the 45-inch reference line on the level plate.

21. Install V_2 plate on the crossbar and position the plate longitudinally using the correction value in Column 5 of Table A4-2.

22. Mount the theodolite on the V_2 plate. Level the theodolite and adjust the vertical angle to 90°.

23. View the vertical scale on the reference station in front of the vehicle and adjust height of crossbar to the value shown in Column 6 of Table A4-2. Verify that the crossbar is still horizontal after this adjustment and that it is still over the line determined in step 16.

NOTE: After completion of step 23, the vehicle and fixture are ready for the measurements.

APPENDIX A5

MEASUREMENT PROCEDURE

C. TEST CONDITIONS

The vehicle shall be tested using the following test conditions:

1. The car attitude shall be stabilized on a horizontal surface with four jacks to prevent movement when being tested. The car attitude shall be as specified by the manufacturer.

2. All vehicle openings are closed, such as windows and hatchback tailgates, except the two front windows which may be opened, if necessary to accommodate measurement equipment.

3. The rearview mirrors are adjusted to normal driving position for an eye point 1.5 inches below "V" (5.8 inches above the mounting plate).

4. The sunvisor is adjusted in its stored position.

5. The steering wheel is positioned so that the front wheels are approximately straight ahead. An adjustable steering wheel is positioned in its lowest driving position.

6. Seats and/or head restraints may be removed if necessary to accommodate the measurement equipment. Seats, seat belts, and head restraints shall not be included as obstructions in the measurements.

D. MONOCULAR MEASUREMENTS

1. Move the plumb bob along the lateral scale in front of the vehicle so that it is at the distance shown in Column 7, Table A1-2, A2-2, A3-2, or A4-2. With the vertical crosshair on the plumb bob, set the horizontal angle to zero. Mark this point on the windshield and label point "V_2."

2. Rotate the instrument to the nine o'clock position and sweep clockwise until an obstruction to the line of sight is encountered. Record in Table A1-1, A2-1, A3-1, or A4-1, the angle and distance to the point at which the obstruction is encountered.

3. Sweep to the opposite side of that obstruction and also record the angle and distance in this position.

4. Continue sweeping clockwise until the next obstruction is encountered and repeat the measurements described above. Continue in this fashion until the telescope is in the six o'clock or 180-degree position, recording all obstruction angles and distances.

5. With the theodolite adjusted to a horizontal angle of zero (straight ahead), rotate the telescope downward through the angle specified in Column 4 of Table A5-1. Mark this point on the windshield for future reference.

6. Remove the theodolite from the V_2 plate and install the extended V_1 plate onto the V_2 plate.

7. Reinstall the theodolite in the extreme left mounting hole in the V_1 plate. Level the instrument and verify that the sight tube is level regardless of the angle in which it is pointed.

8. Set the vertical angle of the theodolite to 90°. Read the height of the instrument on the vertical scale in the front of the automobile and verify that it is the same as specified in Column 8, Table A1-2, A2-2, A3-2, or A4-2.

9. With the vertical crosshair on the plumb bob, adjust the horizontal angle to zero. Mark the V_1 point on the windshield.

10. Rotate the instrument to the nine o'clock position and sweep clockwise until an obstruction to the line of sight is encountered. Record in Table A1-1, A2-1, A3-1, or A4-1, the angle and distance to the point at which the obstruction is encountered.

TABLE A5-1. ANGULAR DIMENSIONS FOR HORIZONTAL LINES IN THE VIEW AREA

	Column 1	Column 2 (For Reference Only)	Column 3	Column 4
	Reference Point Height (in.)	Angle Relative to X-Y Plane		
		For Side b	For Side d	For Side f
		Up	Up	Down
T-Bird	18.74*	9.0	12.0	3.0
Fairmont	18.26*	9.0	12.0	3.0
LTD	19.94*	9.0	12.0	3.0
LTD-II	18.55*	9.0	12.0	3.0
Fiesta	18.37*	9.0	12.0	3.0
Camaro	16.75**	9.0	12.0	3.0
Corvette	15.12**	9.0	12.0	3.0
Skyhawk	17.25**	9.0	12.0	3.0
Chevette	18.75**	9.0	12.0	3.0
Malibu	20.90**	8.5	11.0	3.5
Caprice	20.25**	8.5	11.0	3.5
Cordoba	18.39***	9.0	12.0	3.0
Volare	18.98***	9.0	12.0	3.0
Diplomat	19.49***	9.0	12.0	3.0
Arrow	17.03***	9.0	12.0	3.0
Horizon	18.69***	9.0	12.0	3.0
Gremlin	16.84*	9.0	12.0	3.0
Concord	17.01*	9.0	12.0	3.0
Pacer	17.83*	9.0	12.0	3.0

*At design load per SAE J1100.
**At curb weight.
***Loaded with passengers but no luggage.

11. Sweep to the opposite side of that obstruction and also record the angle and distance in this position.

12. Continue sweeping clockwise until the next obstruction is encountered and repeat the measurements described above. Continue in this fashion until the telescope is in the six o'clock location, recording all obstruction angles and distances as the telescope sweeps through the required angles.

E. VIEWING AREA A LOCATION

NOTE: These measurements will be made with the telescope set up in the V_1 position as in the previous measurements. The object here is to lay out the six-sided figure shown in Figure A5-1.

1. Rotate the telescope to a horizontal angle 17° counterclockwise from the zero position (343°). Mark points on the windshield at three different vertical angles so that the points extend from the top to the bottom of the windshield (Side a, Figure A5-1).

2. Rotate the telescope to a horizontal angle 13° counterclockwise from the zero position (347°). Mark points on the windshield at three different vertical angles so that the points are in the top half of the windshield (Side c, Figure A5-1).

3. Rotate the telescope to a horizontal angle of 22° clockwise from the zero position (22°). Mark points on the windshield at three different vertical angles so the points extend from the top to the bottom of the windshield (Side e, Figure A5-1).

4. Rotate the telescope upward in the vertical plane to the angle listed for this vehicle in Column 2, Table A5-1. Have a helper place a point on the windshield, aligned with the horizontal crosshair in the telescope (Side b, Figure A5-1).

5. Rotate the telescope upward from this position to the angle specified in Column 3, Table A5-1, for this automobile and again have a helper place a point on the windshield at the horizontal crosshair position (Side d, Figure A5-1).

6. Move the theodolite to the hole in the extended V_1 plate 3 inches to the right of the first hole.

7. Move the plumb bob at the front reference station 3 inches to the right.

8. Level the theodolite and zero the horizontal angle on the plumb bob.

9. Repeat steps 4 and 5.

10. Move the theodolite to the hole in the extended V_1 plate 9 inches to the right of the first hole.

11. Move the plumb bob at the front reference station 9 inches to the right.

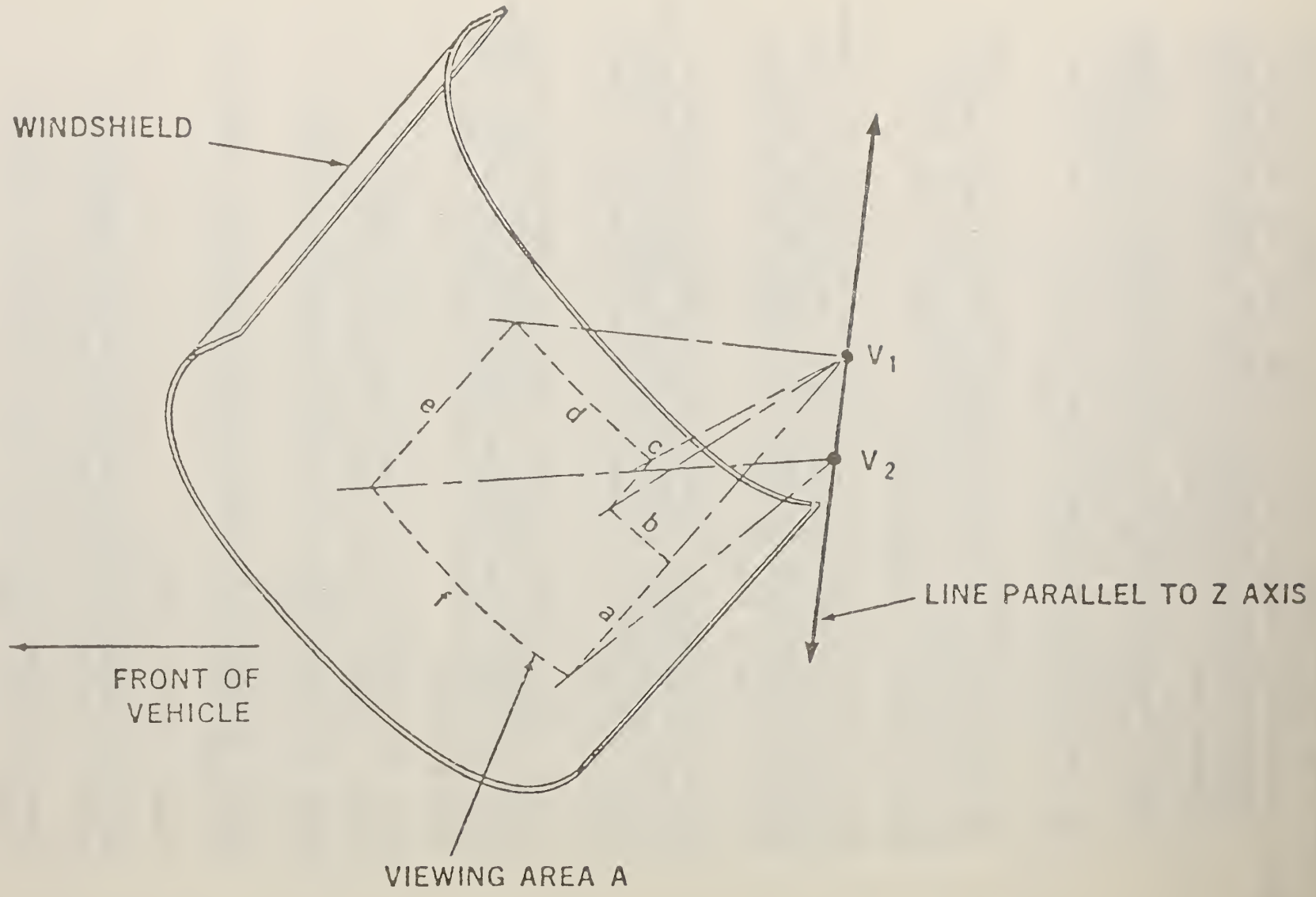


Figure A5-1. Viewing Areas on Windshield.

12. Level the theodolite and zero the horizontal angle on the plumb bob.

13. Repeat steps 4 and 5.

14. Remove the theodolite from the V_1 plate.

15. Remove the extended V_1 plate and spacers. Mount the V_1 plate directly on the V_2 plate.

16. Install the theodolite in the 9-inch hole on the extended V_1 plate.

17. Level the theodolite and zero the horizontal angle on the plumb bob.

18. Rotate the telescope downward from the level position to the angle specified in Column 4 of Table A5-1. Again mark a point on the windshield which coincides with the horizontal crosshair on the telescope.

19. Move the theodolite to the 6-inch hole on the extended V_1 plate.

20. Move the plumb bob at the front reference station to the 6-inch position.

21. Level the theodolite and zero the horizontal angle on the plumb bob.

22. Rotate the telescope downward from the level position to the angle specified in Column 4 of Table A5-1. Mark this point on the windshield.

23. Move the theodolite to the extreme left hole on the extended V_1 plate.

24. Move the plumb bob to the 0-position at the front reference station. The location on the lateral scale should be the value in Column 7 of Table A1-2, A2-2, A3-2, or A4-2.

25. Level the theodolite and zero the horizontal angle on the plumb bob.

26. Rotate the telescope downward from the level position to the angle specified in Column 4 of Table A5-1. Mark this point on the windshield.

27. Measure the distance between the points located in step 26 and step 5 of Section D "Monocular Measurements."

28. Offset the points located in steps 18 and 22 by the distance measured in step 27. Connect these points. This is Side f of Figure A5-1.

29. Remove the theodolite.

30. Install the sunvisor mapping device in the extreme left hole in the V_1 plate.

31. Place the sunvisor in its full-use position, i.e., the position in which it obstructs the most view of the windshield as seen from the V_1 position. By means of the mapping device project the sunvisor outline onto the windshield and draw the position of the sunvisor with a felt tip pen.

32. Estimate whether front edge of hood is visible through the viewing area from the V_1 position: yes___ no___

33. Transfer the viewing area, sunvisor obstruction area, hood obstruction outline, and V_1 and V_2 points to vellum cut to the shape of the windshield.

F. BINOCULAR OBSTRUCTION ANGLES

1. Remove the V_2 plate from the horizontal crossbar and attach the P plate. After attaching the P plate, insert the shaft of the E plate in the P_1 hole of the P plate. Insert the referencing pin in the bottom of the P plate and through the E plate (this aligns the axis of the E plate parallel to that of the P plate and thus also parallel to the Zero Y plane). Clamp the two plates together at this time to aid in further setup.

2. Install the theodolite in the E_1 hole.

3. Set up the plumb bob at the front of the car so that it is the distance from the vehicle centerline (Zero Y plane) shown in Column 1, Table A5-2.

4. Level the theodolite and adjust the horizontal angle reading so the plumb bob is at the zero position.

5. Verify that the instrument is at the height shown in Column 2 of Table A5-2.

6. Record the distance from E_1 to the windshield (forward and horizontal).

7. Rotate the telescope to the nine o'clock position (270°) then sweep clockwise until an obstruction to the line of sight is encountered. Read the angle on the horizontal circle and record angle and distance on Data Sheet 4A.

8. If the angle in step 7 is less than 330°, set the telescope to a horizontal angle reading of 330°. Remove the clamp holding the E and P plates together. Rotate the E plate until the obstruction is again in view. Replace the clamp holding the plate together. If the angle observed earlier was greater than 330°, do not disturb the original relationship between the E and P plates, but begin the obstruction measurements at that point.

9. Measure the distance from E_1 to the obstruction and record on Data Sheet 4A.

10. With the E and P plates remaining clamped, swing the telescope to 90° and establish a bench mark on the wall of the room to aid in repositioning the theodolite to E_2. The point on the wall will lie on an extension of the line passing through points E_1 and E_2.

TABLE A5-2. BINOCULAR MEASUREMENT SETUP DIMENSIONS

Vehicle	Column 1 E_1 Lateral Distance From Vehicle Centerline	Column 2 Height Above Ground (in.)	Column 3 E_4 Lateral Distance From Vehicle Centerline	Column 4 Height Above Ground (in.)
T-Bird	-18.41	43.19	-13.22	43.19
Fairmont	-17.17	42.92	-11.98	42.92
LTD	-19.64	44.39	-14.45	44.39
LTD-II	-18.41	43.00	-13.22	43.00
Fiesta	-14.07	43.12	-8.88	43.13
Camaro	-17.56	41.31	-12.37	41.31
Corvette	-15.32	38.82	-10.13	38.82
Skyhawk	-15.22	41.81	-10.03	41.81
Chevette	-15.22	43.20	-10.03	43.20
Regal	-18.08	45.08	-12.89	45.08
Caprice	-19.02	44.70	-13.83	44.70
Malibu	-18.08	45.46	-12.89	45.46
Cordoba	-18.16	42.95	-12.97	42.95
Volare	-16.68	43.54	-11.49	43.54
Diplomat	-16.63	44.05	-11.44	44.05
Arrow	-15.34	41.59	-10.15	41.59
Horizon	-15.91	43.25	-10.72	43.25
Gremlin	-17.07	41.40	-11.88	41.40
Concord	-17.07	41.77	-11.88	41.77
Pacer	-18.01	42.59	-12.82	42.59

11. Remove the theodolite from the E_1 hole and place it in the E_2 hole. Set the horizontal angle reading to 90° and flip the clutch lever to hold this reading. Level the instrument and aim the telescope at the bench mark established in paragraph 10. Release the clutch.

12. Now swing the telescope clockwise until the line of sight is on the opposite side of the obstruction. Record the horizontal angle and the distance from E_2 to the obstruction on Data Sheet 4A.

13. Repeat steps 6 through 12 above for all other obstructions in the Zone I region.

14. For Zone II measurements, remove the E plate from the P_1 hole and insert the shaft in the P_2 hole. The theodolite will now be set up in the E_4 mounting hole (previously called E_2).

15. Move the plumb bob to the distance from the centerline shown in Column 3 of Table A5-2. Align the E plate in the straightforward position using the referencing pin as in paragraph 1.

16. Level the theodolite and adjust the horizontal angle reading so the plumb bob is at the zero degree position.

17. Rotate the telescope to the three o'clock position and then move it back counterclockwise until an obstruction is encountered. Read the angle on the horizontal circle and record it on Data Sheet 4A.

18. Record the distance on Data Sheet 4A from E_4 to the obstruction.

19. If the angle in step 17 is 30° or less, continue with step 20. If the angle is greater than 30°, set the theodolite to a horizontal angle reading of 30°. Remove the clamp holding the E and P plates together and rotate the E plate until the obstruction is again in view. Replace the clamp.

20. With the E and P plates clamped together, swing the telescope counterclockwise to a horizontal angle of 270°. Establish a benchmark on the wall to aid in repositioning the theodolite to E_3. The point on the wall will lie on an extension of the line connecting points E_3 and E_4.

21. Move the theodolite to the E_3 hole. Set the horizontal angle reading to 270° and flip the clutch lever to hold this reading. Level the theodolite and aim the telescope at the benchmark established in step 20. Release the clutch.

22. Swing the telescope counterclockwise until the opposite side of the obstruction is in view. Record on Data Sheet 4A the horizontal angle and the distance from E_3 to the obstruction.

23. Repeat steps 17 through 22 for all other obstructions in Zone II.

APPENDIX A6

STATEMENT OF WORK

EXHIBIT A

STATEMENT OF WORK

"Visibility Tests of 1978 Model Cars"

The Contractor shall furnish all necessary personnel, facilities, materials, equipment and services, and, in consultation with NHTSA, conduct Visibility Tests of 1978 Model Cars.

A. BACKGROUND

The National Highway Traffic Safety Administration (NHTSA) is developing a new standard on "Fields of Direct View." This project will provide needed data by measuring obstructions to the driver's line of sight and measuring specific windshield surface areas on a selected sample of 1978 model passenger cars.

B. OBJECTIVE

The purpose of this project is to provide NHTSA with quantitative visibility data on current model cars which the NHTSA can analyze for a future Notice of Proposed Rulemaking on "Fields of Direct View." Twenty domestic models will be measured for the size of "A" pillar obstruction using binocular testing techniques, and monocular measurements will be taken from two eye reference points in the forward 180 degrees and in the rear right quadrant of the vehicle using the test procedures described in this work statement. In addition, the Contractor will prepare scale drawings showing the windshield, the viewing area specified in this work statement, and the relationship of this area to the wiper area requirements as specified by FMVSS No. 104, "Windshield Wiping and Washing Systems."

C. DATA PROVIDED BY THE NHTSA

The NHTSA will mail the Contractor data from the manufacturers describing the eye reference data and the windshield overlays (showing the wiper area requirements) for ten vehicles within four working days after award of the contract. The data for the remaining ten vehicles will be mailed no later than 25 days after award. The eye reference information from the manufacturer will explain how to locate the SAE "Eyellipse" in the vehicle, the longitudinal seat adjustment range, and the recommended seat back angle. This data, together with procedures described in this work statement, will locate the binocular eye reference points (E_1, E_2, E_3, and E_4), the pivot points (P_1 and P_2), and the V-points (V_1 and V_2). Information on the test procedures and use of these eye reference points is explained in the last section of this work statement entitled "test procedures."

D. TEST VEHICLES

The tests will be conducted on the following 20 1978 model low mileage passenger cars. The Contractor is responsible for obtaining these vehicles with only original equipment by rental or other means for the visibility tests. The Contractor should make every effort to obtain the models listed below. If he cannot obtain a particular model, he may suggest an alternative model for prior approval by the NHTSA Contract Technical Manager (CTM). There can be, however, no substitution for the AMC Pacer or the GMC Corvette. The models to be tested are:

1. AMC Gremlin, Custom 2-door
2. AMC Pacer D/L Hatchback 2-door
3. AMC Concord 2-door Sedan with D/L package (small rear side windows)
4. AMC Matador Barcelona 2-door Coupe (small rear side windows)
5. Ford Thunderbird, 2-door (thickly padded vinyl roof and small opera windows)
6. Ford Fairmont, 2-door Sedan (front vent windows and rear ventilation louvers)
7. Ford LTD, 4-door, Pillared Hardtop
8. Ford LTD II, 2-door, Hardtop with Sports Tourine Package (no rear side windows)
9. Ford Fiesta, 2-door Sedan
10. Chevrolet Camero, Sport Coupe
11. Chevrolet Corvette Coupe
12. Chevrolet Monza 2+2 Hatchback Coupe (wide "B" pillar)
13. Chevrolet Chevette, 4-door, Hatchback Sedan
14. Buick Regal, 2-door, Sport Coupe
15. Chevrolet Caprice, 4-door Sedan, Classic
16. Chrysler Cordoba with Landau Vinyl roof (and opera windows)
17. Dodge Challenger, 2-door, with rear side louvers
18. Plymouth Volare Coupe with Landau Vinyl roof (small rear side windows)
19. Dodge Diplomat, 4-door Sedan
20. Plymouth Arrow, 2-door, with louvers on rear sides

E. SCHEDULE

Since the NHTSA needs this visibility measurement data as soon as possible, the contract work, together with the final report, must be completed no later than 75 calendar days after award. In order to provide the NHTSA with data as it is being developed, the following schedule must be met:

1. Forty (40) calendar days after award, binocular, monocular and windshield measurement data shall be submitted on no less than five (5) cars.

2. Fifty (50) calendar days after award, binocular, monocular, and windshield measurement data shall be submitted on no less than five (5) additional cars, bringing the total to ten (10).

3. Sixty (60) calendar days after award, binocular, monocular, and windshield measurement data shall be submitted on no less than five (5) additional cars, bringing the total to fifteen (15).

4. Seventy (70) calendar days after award, binocular, monocular, and windshield measurement data shall be submitted on no less than five (5) additional cars, bringing the total to twenty (20).

F. BINOCULAR TESTS

Using the test procedures and test conditions described in this work statement, measure the "A" pillar binocular obstruction angle (to the nearest 1/4 degree) for both the left and right pillar in the horizontal plane through the "E" and "P" points. If any other obstruction in the forward 180 degrees is large enough to create a binocular obstruction (such as a low mounted inside mirror), measure and record its obstruction angle too. Record the data for each vehicle on a single sheet of normal sized paper. Include the following information:

1. Model year
2. Model name
3. Manufacturer
4. Body style
5. VIN number
6. Left "A" pillar obstruction angle
7. Right "A" pillar obstruction angle
8. Other identified binocular obstruction angles
9. Brief explanations pertinent to the specific measurements, such as "Vent window increases the binocular angle by 2 degrees" and supplemental black and white photographs to show the problem.
10. Dimensional data defining the location of the "E" and "P" points from the seating reference point.
11. A plan view sketch (to scale) showing the relationship and distances (to nearest 1/4 inch) of the "A" pillars, windshield, and other obstructions to the "E" and "P" points.

A copy of this report shall be sent to NHTSA to meet the schedule requirements specified in Section (E). A copy will also be included in the final report.

G. MONOCULAR TESTS

Using the test procedures and test conditions described in this work statement, measure all monocular obstructions in a horizontal plane through "V_1," and in a horizontal plane through "V_2" in the forward 180 degrees and in the right rear quadrant. This will measure obstructions at two vertical positions starting to the left of the driver, around through the passenger position, and continuing to a point directly behind the driver. Record the data for each "V" point on a separate page and for each vehicle on a single sheet of normal sized paper. Include the following information:

1. Model year
2. Model name
3. Manufacturer
4. Body style
5. VIN number
6. All obstructions -- identify each
7. Brief explanations pertinent to the specific measurement, such as "Obstruction made larger because of heavy interior padding around window" and supplemental black and white photographs to show the problem.
8. Dimensional data defining the location of the appropriate "V" point from the seating reference point.
9. A plan view sketch (to scale) showing the relationship and distances (to nearest 1/4 inch) of the various obstructions to the appropriate "V" point.

A copy of this report shall be sent to NHTSA to meet the schedule requirements specified in Section (E). A copy will also be included in the final report.

H. WINDSHIELD AREAS

Using the full scale windshield overlays provided by the manufacturer with the "A", "B", and "C" windshield wiper areas shown on the overlay, outline on this overlay the 6-sided windshield "A" area defined in the test procedures (as measured from "V_1" and "V2"). Note that the "A" wiper area is different from the 6-sided visibility "A" area specified in this work statement. Also outline on this overlay, the projected outline of the sun visor from V_1 when the sun visor is adjusted in its full use position (i.e., when it would obstruct the most view of the windshield as seen from V_1). Reduce this data to normal sized paper and identify each area by legend or coding. Record this data for each vehicle on a single sheet of paper and include the following information:

1. Model year
2. Model name
3. Manufacturer
4. Body style
5. VIN number
6. Overlay areas to scale
7. Dimensional measurements (nearest 1/4 inch) showing the distances on the glazing surface from the 6-sided "A" visibility area to the left "A" pillar and the top and bottom daylight opening of the windshield.
8. Dimensional measurements showing the distances on the glazing surface from the 6-sided "A" visibility area to the "A," "B", and "C" wiper areas.
9. Dimensional measurements showing the distances on the glazing surface from the "A", "B", and "C" wiper areas to the left "A" pillar and the top and bottom daylight openings of the windshield.

A copy of this report shall be sent to NHTSA to meet the schedule requirements specified in (E). A copy will also be included in the final report.

I. TEST CONDITIONS

The vehicle shall be tested using the following test conditions:

1. The car attitude shall be stabilized on a horizontal surface with four jacks to prevent movement when being tested. The car attitude shall be at curb weight, tires inflated to the manufactures recommended operating tire pressure, and a 165 pound weight in the driver's seat.

2. All vehicle openings are closed, such as windows and hatchback tailgates, except the two front windows which may be opened, if necessary, to accommodate measurement equipment.

3. The rearview mirrors are adjusted to normal driving position for an eye point 1.5 inches below "V_1."

4. The sun visor is adjusted in its stored position.

5. The steering wheel is positioned so that the front wheels are approximately straight ahead. An adjustable steering wheel is positioned in its lowest driving position.

6. Seats and/or head restraints may be removed if necessary to accommodate the measurement equipment. Seats, seat belts, and head restraints shall not be included as obstructions in the measurements.

J. TEST PROCEDURES

The test procedures to be used are in Attachment I to this work statement.

ATTACHMENT I

TEST PROCEDURES

A. MONOCULAR TESTS

1. Determine the monocular horizontal width of an obstruction by measuring the angle between two horizontal lines that are tangent to either side of an obstruction and intersect at a point (V_1 and V_2).

2. Record each obstruction angle and identify its horizontal angle left or right, from the zero azimuth (to nearest 1/4 degree).

3. Add the total obstruction angles for each zone.

B. TEST PROCEDURES - Each vehicle shall be capable of meeting the requirements when tested in accordance with the procedures set forth under this heading that are appropriate.

1. Determination of binocular obstruction angle. Using lines that fall in the same horizontal plane, determine binocular obstruction angles as set forth in 2-6.

2. Zone I. Rotate the paired E points about P_1 in the horizontal plane that coincides with P_1, so that the E_1 - E_2 line is parallel to the Y axis.

3. If an angle greater than 120° exists between line E_1 - E_2 and the line that originates at E_1 and is tangent to the left edge of the obstruction being measured, rotate the paired E points about P_1 until the angle is reduced to 120° (Figure 3).

4. Draw a line from E_2 that is parallel to the line that originates at E_1 and is tangent to the left edge of the obstruction being measured.

5. To determine the binocular obstruction angle, measure the angle between the line from E_2 described in paragraph 4 and the line that originates at E_2 and is tangent to the right edge of the obstruction (Figure 3).

6. Zone II. Use the procedure specified in Section 2, substituting P_2 for P_1, and substituting E_3 and E_4 for E_1 and E_2 respectively. For calculation of the binocular obstruction angle in Zone II, the line described in 3 originates from the E_4 point and is tangent to the right edge of the obstruction, the line described in 4 originates from point E_3, and the line described in 5 originates at E_3 and is tangent to the left edge of the obstruction (Figure 3).

C. Orthogonal reference system. The requirements are expressed in relation to axes, planes, zones, and points that together constitute an orthogonal reference system which originates at the vehicle's R point (Figure 1) and is described in 1-10.

1. R-Point. The R-point is a point within the occupant compartment that is designated by the vehicle manufacturer in accordance with 2 below.

2. In the case of a vehicle which is designed for a seated driver, the R-point coincides with the two-dimensional coordinates of the seating reference point and the vertical plane that bisects the driver's designated seating position in the fore and aft direction with respect to the seating position or, at the option of the manufacturer, a point not more than 3 inches outboard of this plane on the horizontal transverse line that passes through the seating reference point. In the latter case, the R-point is positioned by going outboard from the SRP the horizontal transverse distance to the projected SAE 941 X-X locator line (Eyellipse X-X Line) and then going inboard 1.05 inches to the R-point location.

3. Reference axes and planes. Three orthogonal reference planes are established to determine the dimensional relationship between the R-point and the V, E, and P points. The X-axis is the horizontal line passing through the R-point that is parallel to the vertical plane that coincides with the vehicle's longitudinal center line. It is negative forward of the R-point and positive to the rear. The Y-axis is the horizontal line perpendicular to the X-axis that passes through the R-point. It is negative to the left of the R-point and positive to the right. The Z-axis is the vertical line passing through the R-point that is perpendicular to both the X- and Y-axes. It is negative below the R-point and positive above it (Figure I). The plane through the X- and Z-axes is denoted as the X-Z plane, while those planes passing through the X- and Y-axes and the Y- and Z-axes are denoted the X-Y and Y-Z planes, respectively.

4. V-Points. Two reference points, V_1 and V_2, are used to define viewing areas on the windshield, and evaluate monocular obstructions.

5. V_1-Point. When the driver's recommended seat back angle is 25°, V_1 is located 26.[illegible] inches above the X-Y plane, 2.67 inches to the rear of the Y-Z plane and 0.20 inches to the left of the X-Z plane. For a recommended seat back angle other than 25°, the X and Z coordinates for the V points are corrected as set forth in Table III.

6. V_2-Point. V_2 is located 3.00 inches directly below V_1.

7. Test Zones. The vehicle is divided into four zones for purposes of applying the monocular and binocular viewing requirements. These zones are bounded by two vertical planes, one through V_1 parallel to the X-Z plane, the other through V_1 parallel to the Y-Z plane. The forward left quadrant is designated Zone I, while the forward right quadrant, the rearward left quadrant, and the rearward right quadrant are designated Zone II, Zone III, and Zone IV, respectively. (Figure 2).

8. P-Point. When the driver's recommended seat back angle is 25° and the longitudinal seat adjustment range is less than 4.25 inches, P_1 is 24.66 inches above the X-Y plane, 1.40 inches to the rear of the Y-Z plane, and 0.80 inches to the left of the X-Z plane, and P_2 is 24.66 inches above the X-Y plane, 2.50 inches to the rear of the Y-Z plane, and 1.85 inches to the right of the X-Z plane. These point locations are adjusted in the X and Z coordinates for a driver's seat with a recommended seat back angle other than 25° as set forth in Table III, and in the X-coordinate for a driver's seat which has a longitudinal adjustment range of 4.25 inches or more as shown in Table II.

9. E-points. Four reference points, E_1 through E_4, are used to evaluate binocular obstructions in the forward field of view for all vehicles and visibility of the cylindrical test target for buses. E_1 and E_2 are paired and used with P_1 in Zone I, while E_3 and E_4 are paired and used with P_2 in Zone II. Their spatial relationship to the vehicle is determined only by reference to the P-points and the test procedure set out in B-1.

The paired E points lie in the same horizontal plane as the P points and are 2.54 inches apart. The distance from the P-point to the midpoint (M) of the line between the paired E points is 3.88 inches. (Figure 4).

10. Viewing Area A. Viewing area A is the six-sided area on the windshield that is bounded, as indicated in Figure 5, by the intersections of each of the following six planes with the windshield:

(a) The vertical plane passing through V_1 that intersects the X-Z plane at an angle of 17 degrees, as measured counterclockwise from the X-Z plane viewed from above (shown as side "a" in Figure 5);

(b) The plane that is perpendicular to the X-Z plane, that passes through V_1, and that intersects the X-Y plane at the angle specified in column (3) of Table IV for the vehicle's R-point height, as measured clockwise from the X-Y plane, viewed from the left side of the vehicle (shown as side (b) in Figure 5);

(c) The vertical plane passing through V_1 that intersects the X-Z plane at an angle of 13 degrees, as measured counterclockwise from the X-Z plane viewed from above (shown as side "c" in Figure 5);

(d) The plane that is perpendicular to the X-Z plane, that passes through V_1, and that intersects the X-Y plane at the angle specified in column (1) of Table IV for the vehicle's R-point height, as measured clockwise from the X-Y plane viewed from the left side of the vehicle (shown as side (d) in Figure 5);

(e) The vertical plane passing through V_1 that intersects the X-Z plane at an angle of 22 degrees, as measured clockwise from the X-Z plane viewed from above (shown as side "e" in Figure 5); and

(f) The plane that is perpendicular to the X-Z plane, that passes through V_2, and that intersects the X-Y plane at the angle specified in column (2) of Table IV for the vehicle's R-point height, as measured counterclockwise from the X-Y plane viewed from the left side of the vehicle (shown as side "f" in Figure 5).

TABLE II

Correction to the X coordinate for the P_1 and P_2 points when the longitudinal seat adjustment range is 4.25 inches or more.

Longitudinal Seat Adjust Range (In Inches)		X Coordinate (In Inches)
At least	But less than	
4.25	4.75	-0.50*
4.75	5.25	-0.88
5.25	5.75	-1.26
5.75	6.25	-1.64
6.25		-1.89

* Negative symbol means a correction to the X coordinate in the forward direction.

TABLE III

Corrections to the X and Z coordinates for the V and P points when the recommended seat back angle is not 25°

Recommended Seat Back Angle ----- (in degrees) ------ At least	But less than	X Coordinates 1/ (In inches)	Z Coordinates 2/ (In inches)
	5.5	-7.34	1.09
5.5	6.5	-6.95	1.08
6.5	7.5	-6.56	1.06
7.5	8.5	-6.17	1.04
8.5	9.5	-5.79	1.02
9.5	10.5	-5.41	0.99
10.5	11.5	-5.03	0.96
11.5	12.5	-4.65	0.92
12.5	13.5	-4.28	0.88
13.5	14.5	-3.91	0.83
14.5	15.5	-3.54	0.78
15.5	16.5	-3.18	0.72
16.5	17.5	-2.81	0.66
17.5	18.5	-2.45	0.59
18.5	19.5	-2.10	0.52
19.5	20.5	-1.74	0.45
20.5	21.5	-1.39	0.37
21.5	22.5	-1.04	0.28
22.5	23.5	-0.69	0.19
23.5	24.5	-0.34	0.10
24.5	25.5	0.00	0.00
25.5	26.5	0.34	-0.10
26.5	27.5	0.68	-0.21
27.5	28.5	1.01	-0.32
28.5	29.5	1.35	-0.44
29.5	30.5	1.68	-0.56
30.5	31.5	2.01	-0.69
31.5	32.5	2.33	-0.82
32.5	33.5	2.65	-0.96
33.5	34.5	2.97	-1.10
34.5	35.5	3.29	-1.24
35.5	36.5	3.61	-1.39
36.5	37.5	3.92	-1.55
37.5	38.5	4.23	-1.71
38.5	39.5	4.54	-1.87
39.5		4.84	-2.04

NOTES: 1/ Negative symbol means a correction to the X coordinate in the forward direction.

2/ Negative symbol means a correction to the Z coordinate in the downward direction.

TABLE IV

Determination of angles for use in establishing planes of Viewing Area A and shade band limit.

R Point Height Above the Ground (in inches)		(1) Up Angle From V_1 to side "d" (in degrees)	(2) Down Angle from V_2 to side "f" (in degrees)	(3) Up Angle from V_1 to side "b" (in degrees)
At Least	But less than			
-	20	12.0	3.0	9.0
20	30	11.0	3.5	8.5
30	40	10.0	4.5	8.0
40	50	9.0	5.5	7.5
50	60	8.5	6.5	7.0
60	70	8.0	7.5	6.5
70		7.5	8.0	6.0

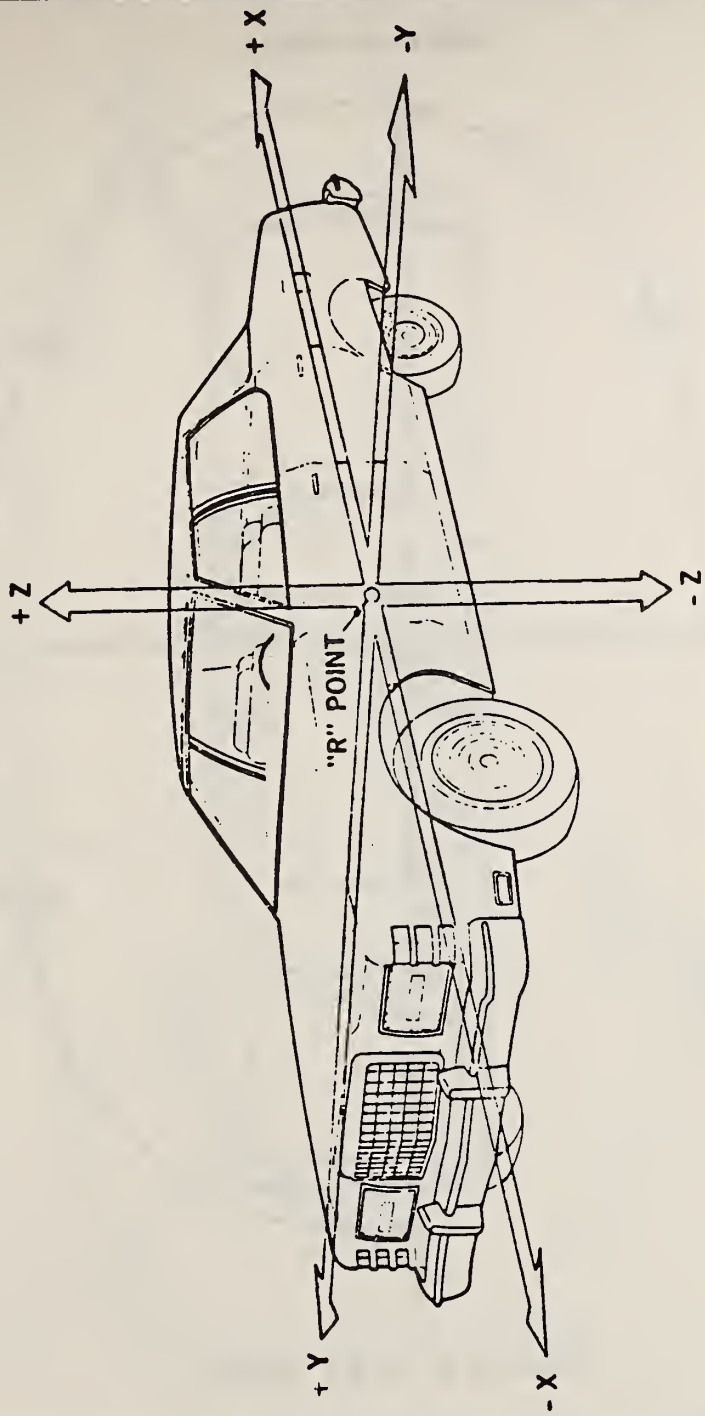


FIGURE 1 THREE ORTHOGONAL REFERENCE AXES

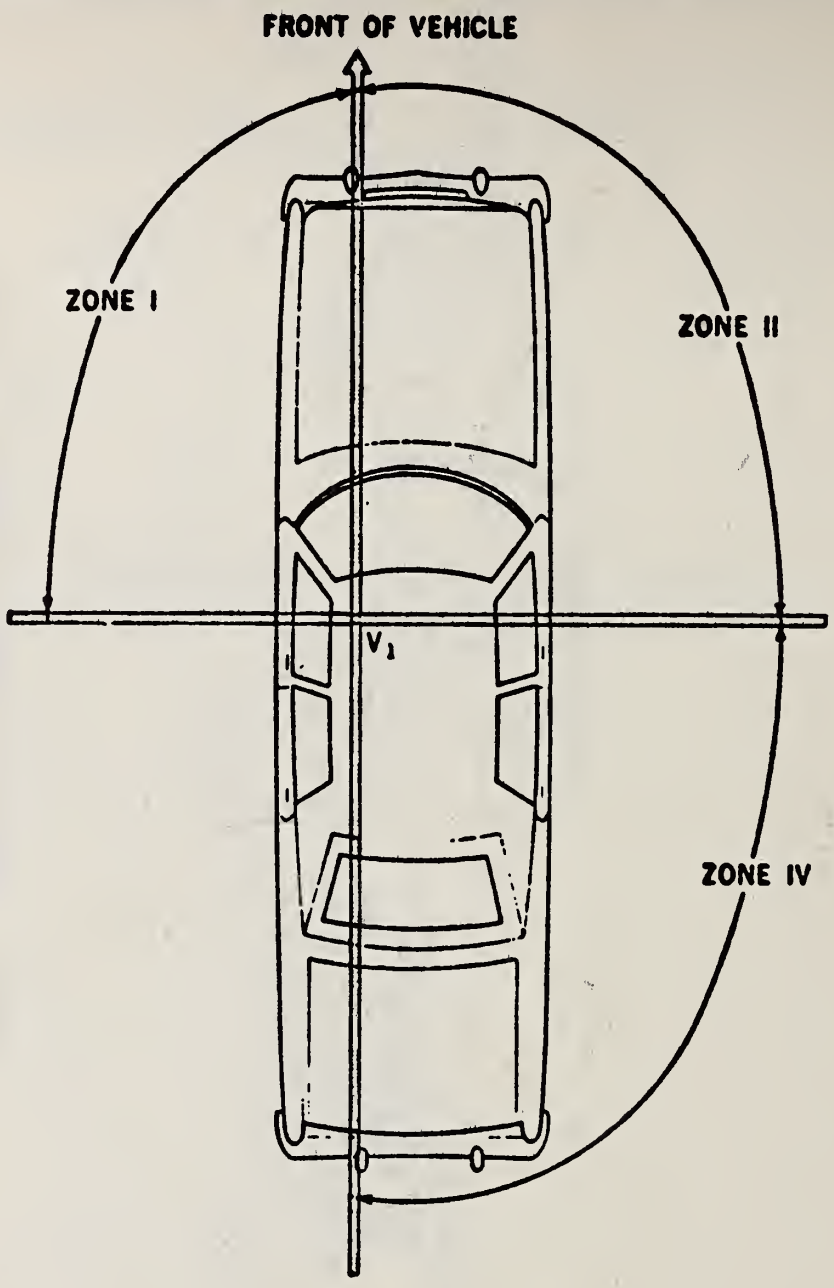


FIGURE 2 TEST ZONES

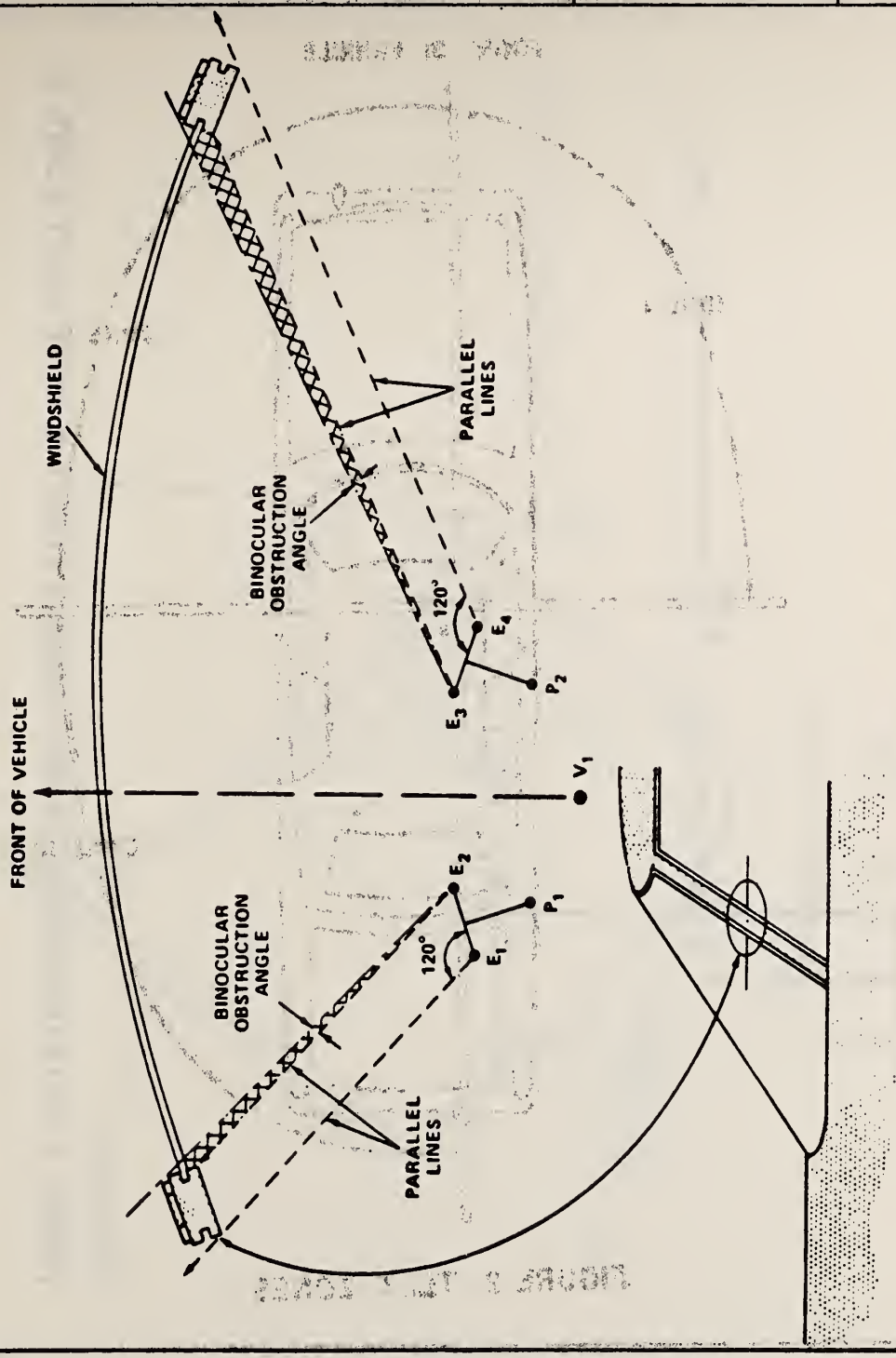


Figure 3 BINOCULAR OBSTRUCTION TEST PROCEDURES

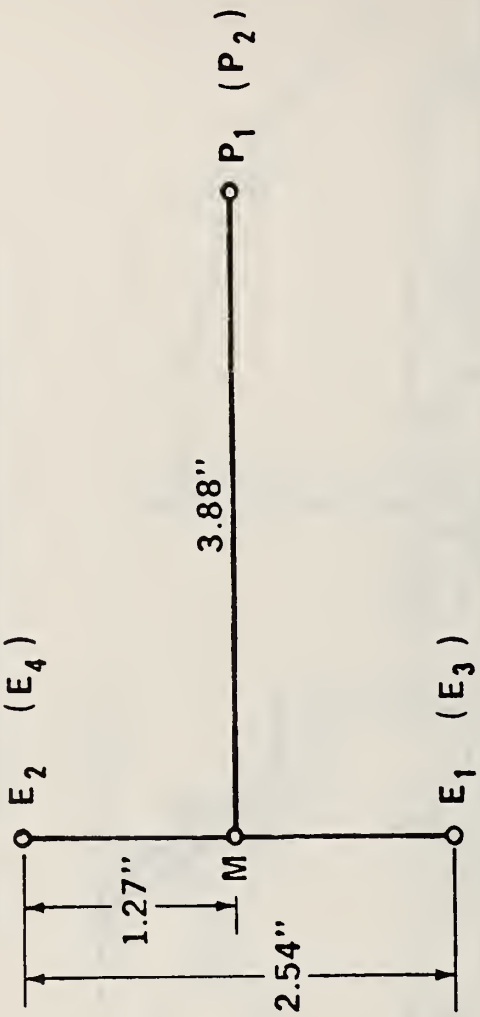


FIGURE 4 RELATIONSHIP BETWEEN PAIRED E POINTS & THEIR PIVOT POINT, P

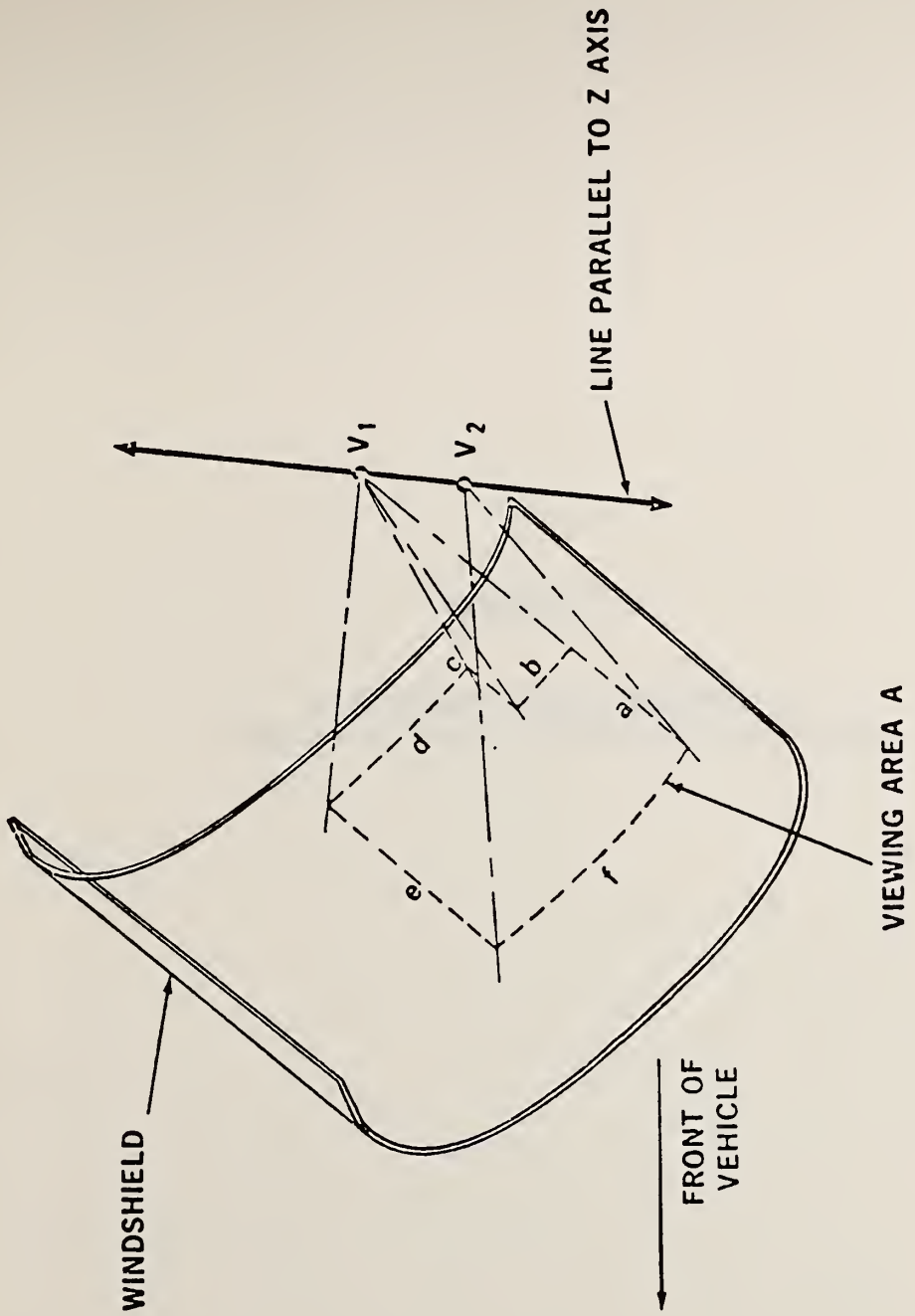


FIGURE 5 WINDSHIELD VIEWING AREA A

APPENDIX B

VISIBILITY MEASUREMENTS ON GENERAL MOTORS CORPORATION VEHICLES

APPENDIX B1 - BUICK REGAL

DATA SHEET NO. 1 - VEHICLE DATA

VEHICLE:

MANUFACTURER General Motors YEAR 1978

MODEL Buick Regal BODY STYLE 2 Door

VIN 4K4738Z129301 ODOMETER 2900

BUILD DATE 3/7/78

SPECIAL OPTIONS

FRONT SEAT TYPE: SPECIFIED Bucket

TILT STEERING WHEEL? YES ____ NO ____

FRONT SEAT TRAVEL RANGE: SPECIFIED 6.34 in.

FRONT SEAT BACK ANGLE: SPECIFIED 26.5°

MEASURING POINT CORRECTIONS

	X (in.)	Z (in.)
P From Table 2	-1.89	--
P From Table 3	+0.68	-0.21
Total P	-1.21	-0.21
V From Table 3	+0.68	-0.21

MANUFACTURER'S REFERENCE POINTS FOR SRP

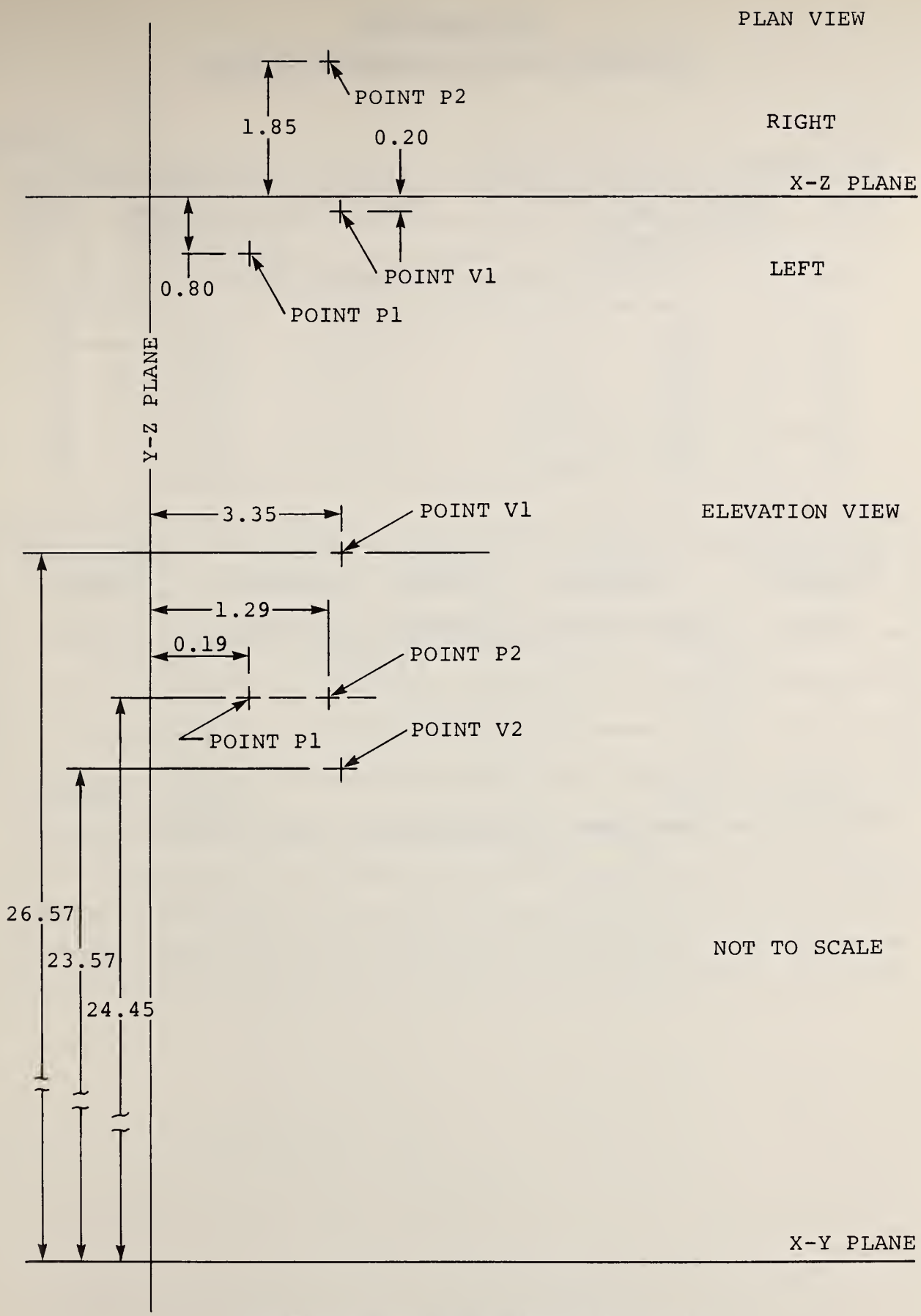
For X 13.70 in. (348) from Front Seat Forward Anchor Hole

For Y -14.49 in. to Zero Y Plane

For Z 7.83 in. (199) from Front Seat Forward Anchor Hole

MANUFACTURER'S DIMENSIONS FOR VEHICLE ATTITUDE AND SRP LOCATION

	From Axle Centerline	From Vehicle Centerline	Height Above Ground (Curb Weight)
Front Station	24.53 in. (Front Axle)	--	9.80 in.
Rear Station	20.94 in. (Rear Axle)	--	9.80 in.
SRP	--	14.49 in.	20.63 in.
"R" Point	--	16.01 in.	20.63 in.



Relationship of Reference Points -
1978 Buick Regal 2-Door Sport Coupe.

DATA SHEET 2

MONOCULAR OBSTRUCTION ANGLE FROM V_1

VEHICLE:

MANUFACTURER General Motors YEAR 1978

MODEL Buick Regal BODY STYLE 2 Door

VIN 4K4738Z129301

LOCATION OF "V" POINT RELATIVE TO THE "R" Point

	V_1	V_2
X	3.35	3.35
Y	-0.20	-0.20
Z	26.57	23.57

OBSTRUCTIONS: Zone I

Elevation	Obstruction	Left Angle	Right Angle	Obstruction Angle
V_1	Left A Pillar	329°45'	338°18'	8°33'

Total 8°33'

Explanations Pertinent to the Specific Measurements:

DATA SHEET 2

MONOCULAR OBSTRUCTION ANGLE FROM V_1

VEHICLE:

MANUFACTURER General Motors YEAR 1978

MODEL Buick Regal BODY STYLE 2 Door

VIN 4K4738Z129301

LOCATION OF "V" POINT RELATIVE TO THE "R" Point

	V_1	V_2
X	3.35	3.35
Y	-0.20	-0.20
Z	26.57	23.57

OBSTRUCTIONS: Zone II

Elevation	Obstruction	Left Angle	Right Angle	Obstruction Angle
V_1	Right A Pillar	63°03'	68°17'	5°14'

Total 5°14'

Explanations Pertinent to the Specific Measurements:

DATA SHEET 2

MONOCULAR OBSTRUCTION ANGLE FROM V_1

VEHICLE:

MANUFACTURER General Motors YEAR 1978

MODEL Buick Regal BODY STYLE 2 Door

VIN 4K4738Z129301

LOCATION OF "V" POINT RELATIVE TO THE "R" Point

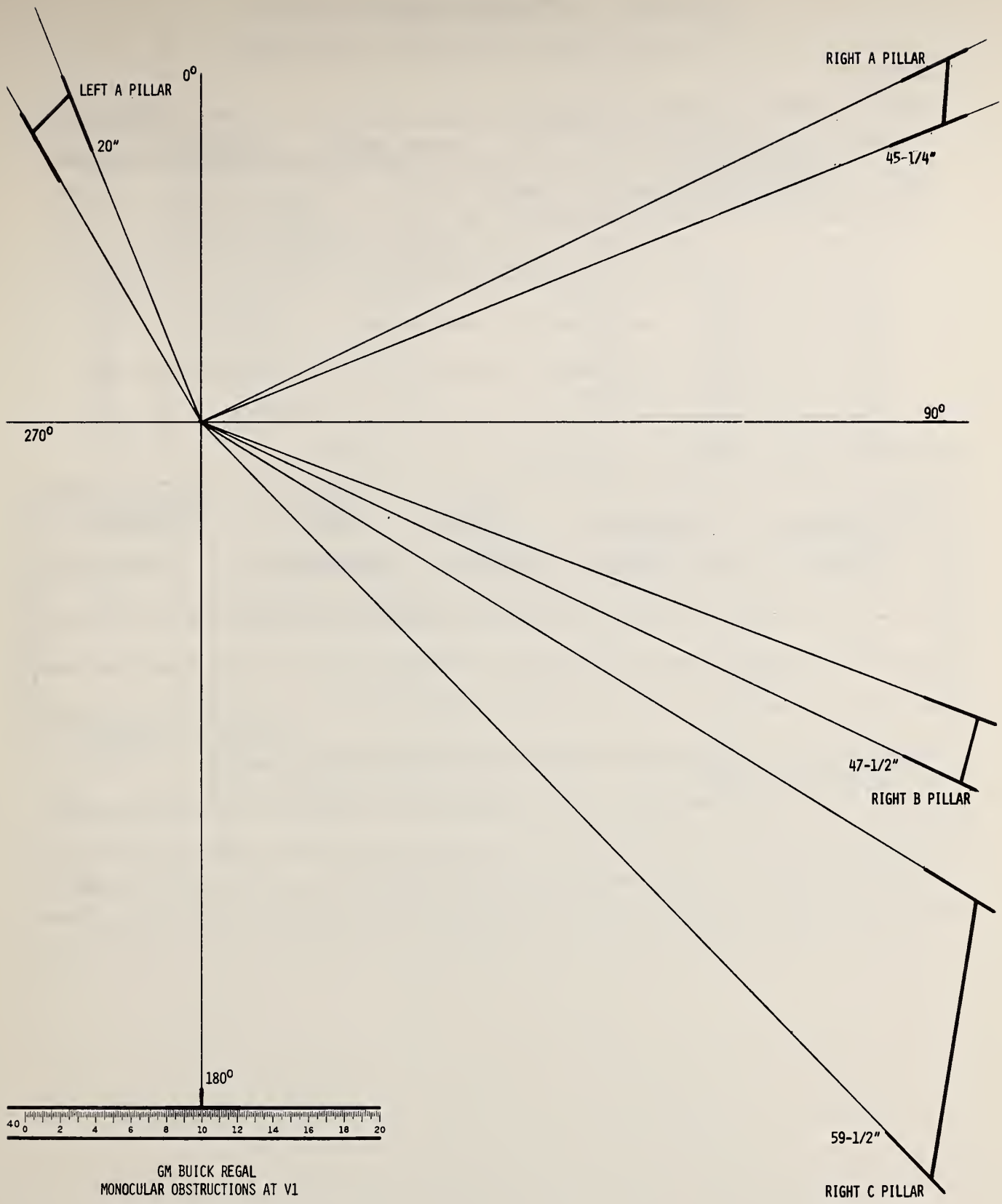
	V_1	V_2
X	3.35	3.35
Y	-0.20	-0.20
Z	26.57	23.57

OBSTRUCTIONS: Zone IV

Elevation	Obstruction	Left Angle	Right Angle	Obstruction Angle
V_1	Right B Pillar	110°55'	115°39'	4°44'
	Right C Pillar	121°46'	136°00'	14°14'

Total 18°58'

Explanations Pertinent to the Specific Measurements:



Plan View of Monocular Obstructions at V_1 - Buick Regal.

DATA SHEET 2

MONOCULAR OBSTRUCTION ANGLE FROM V_2

VEHICLE:

MANUFACTURER General Motors YEAR 1978

MODEL Buick Regal BODY STYLE 2 Door

VIN 4K4738Z129301

LOCATION OF "V" POINT RELATIVE TO THE "R" Point

	V_1	V_2
X	3.35	3.35
Y	-0.20	-0.20
Z	26.57	23.57

OBSTRUCTIONS: Zone I

Elevation	Obstruction	Left Angle	Right Angle	Obstruction Angle
V_2	Left A Pillar	331°25'	338°44'	7°19'

Total 7°19'

Explanations Pertinent to the Specific Measurements:

DATA SHEET 2

MONOCULAR OBSTRUCTION ANGLE FROM V_2

VEHICLE:

MANUFACTURER General Motors YEAR 1978

MODEL Buick Regal BODY STYLE 2 Door

VIN 4K4738Z129301

LOCATION OF "V" POINT RELATIVE TO THE "R" Point

	V_1	V_2
X	3.35	3.35
Y	-0.20	-0.20
Z	26.57	23.57

OBSTRUCTIONS: Zone II

Elevation	Obstruction	Left Angle	Right Angle	Obstruction Angle
V_2	Right A Pillar	59°55'	64°29'	4°34'

Total 4°34'

Explanations Pertinent to the Specific Measurements:

DATA SHEET 2

MONOCULAR OBSTRUCTION ANGLE FROM V_2

VEHICLE:

MANUFACTURER General Motors YEAR 1978

MODEL Buick Regal BODY STYLE 2 Door

VIN 4K4738Z129301

LOCATION OF "V" POINT RELATIVE TO THE "R" Point

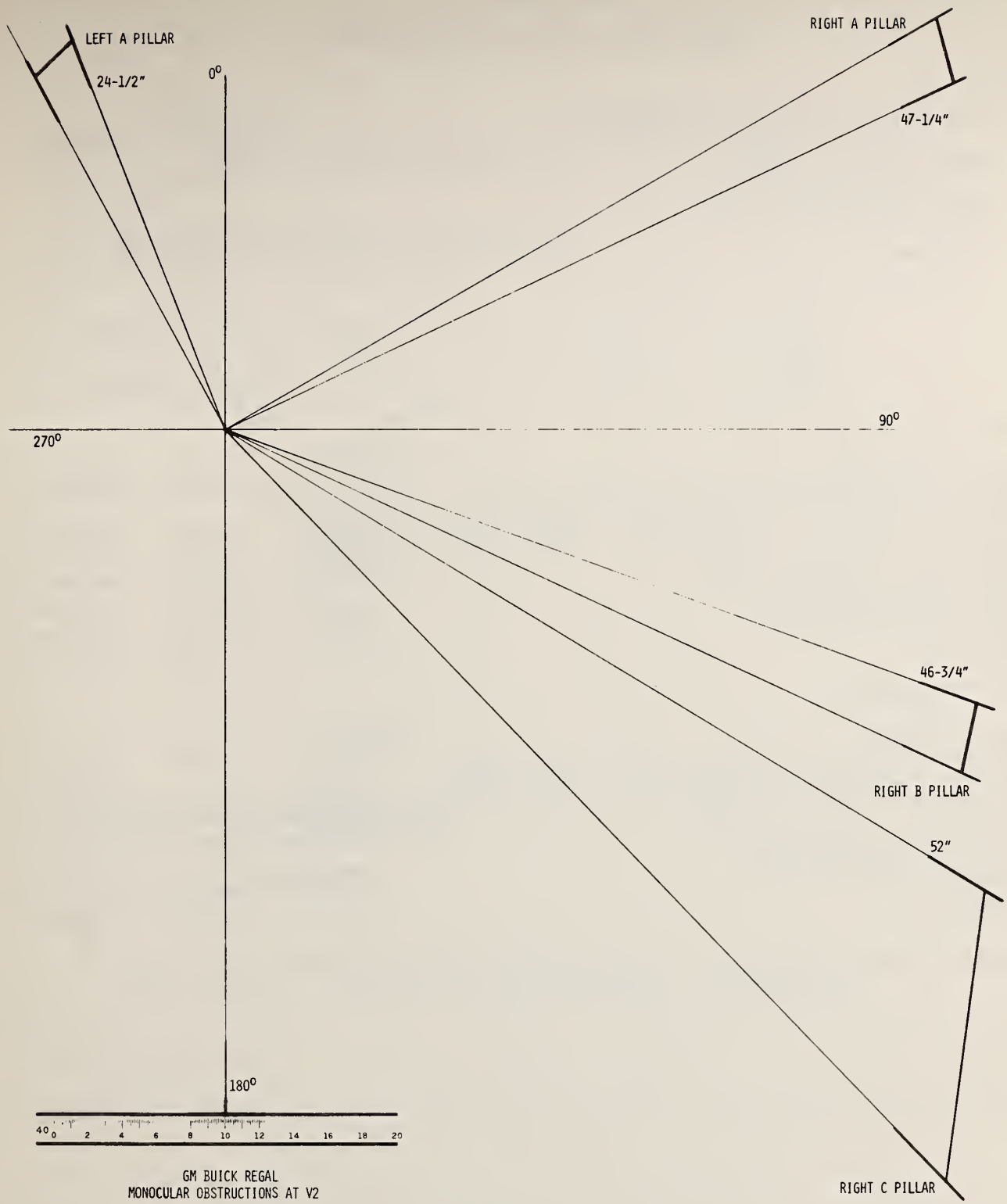
	V_1	V_2
X	3.35	3.35
Y	-0.20	-0.20
Z	26.57	23.57

OBSTRUCTIONS: Zone IV

Elevation	Obstruction	Left Angle	Right Angle	Obstruction Angle
V_2	Right B Pillar	110°19'	114°52'	4°33'
	Right C Pillar	121°18'	136°13'	14°55'

Total 19°28'

Explanations Pertinent to the Specific Measurements:



Plan View of Monocular Obstructions at V_2 - Buick Regal.

DATA SHEET 4

BINOCULAR OBSTRUCTION ANGLES

VEHICLE:

MANUFACTURER General Motors YEAR 1978

MODEL Buick Regal BODY STYLE 2 Door

VIN 4K4738Z129301

	Dimensions Relative to "R" Point		
	X	Y	Z
P_1	0.19	0.80	24.45
P_2	1.29	1.85	24.45

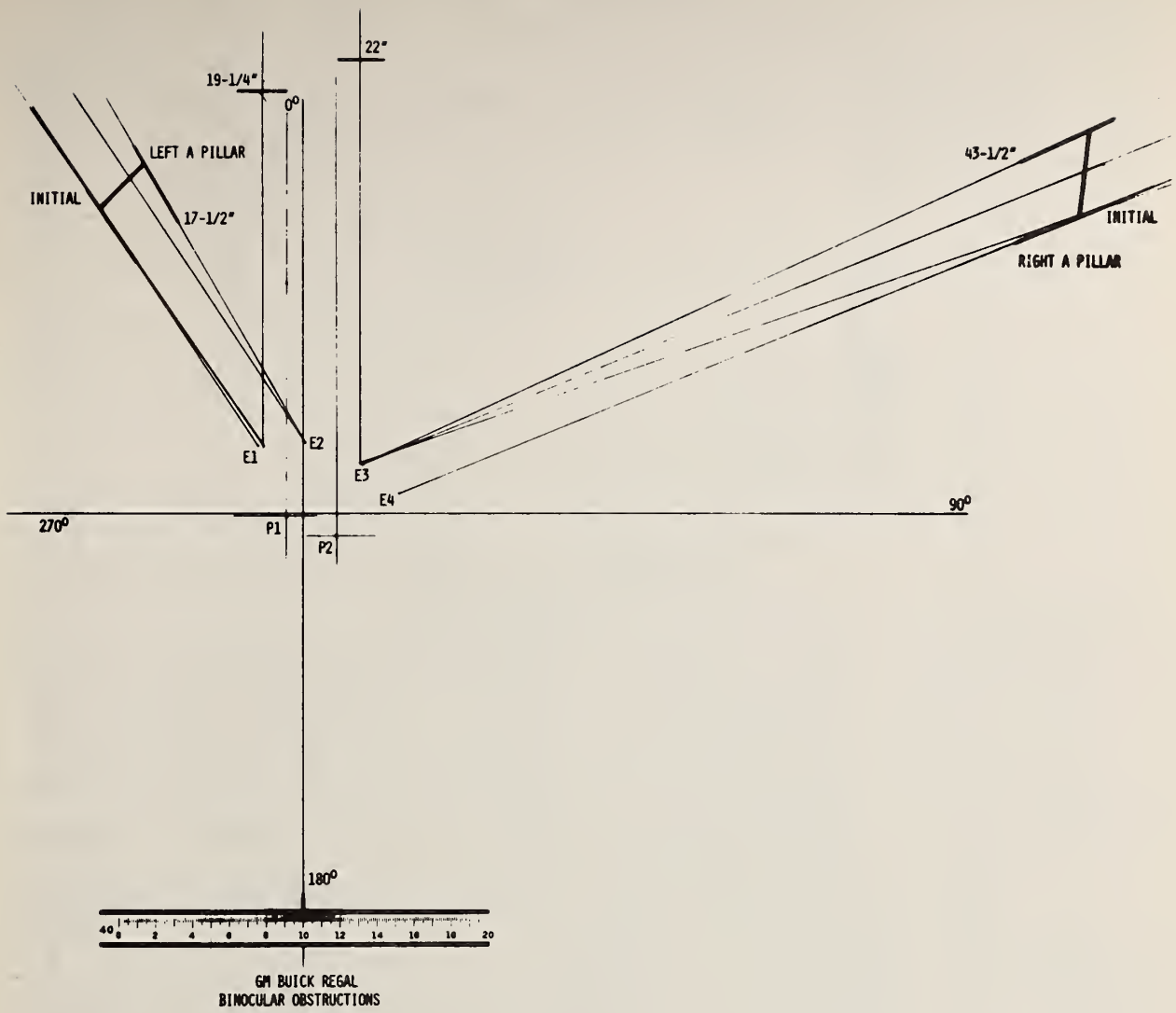
Zone: I

Obstruction	Left A Pillar		
Initial Sight to Outboard E - Rear Side	325°08'		
Adjusted Sight to Outboard E - Rear Side	330°00'		
Inboard E - Front Side	333°32'		
Angle to Bench Mark			
Obstruction Angle	3°32'		
Azimuth			

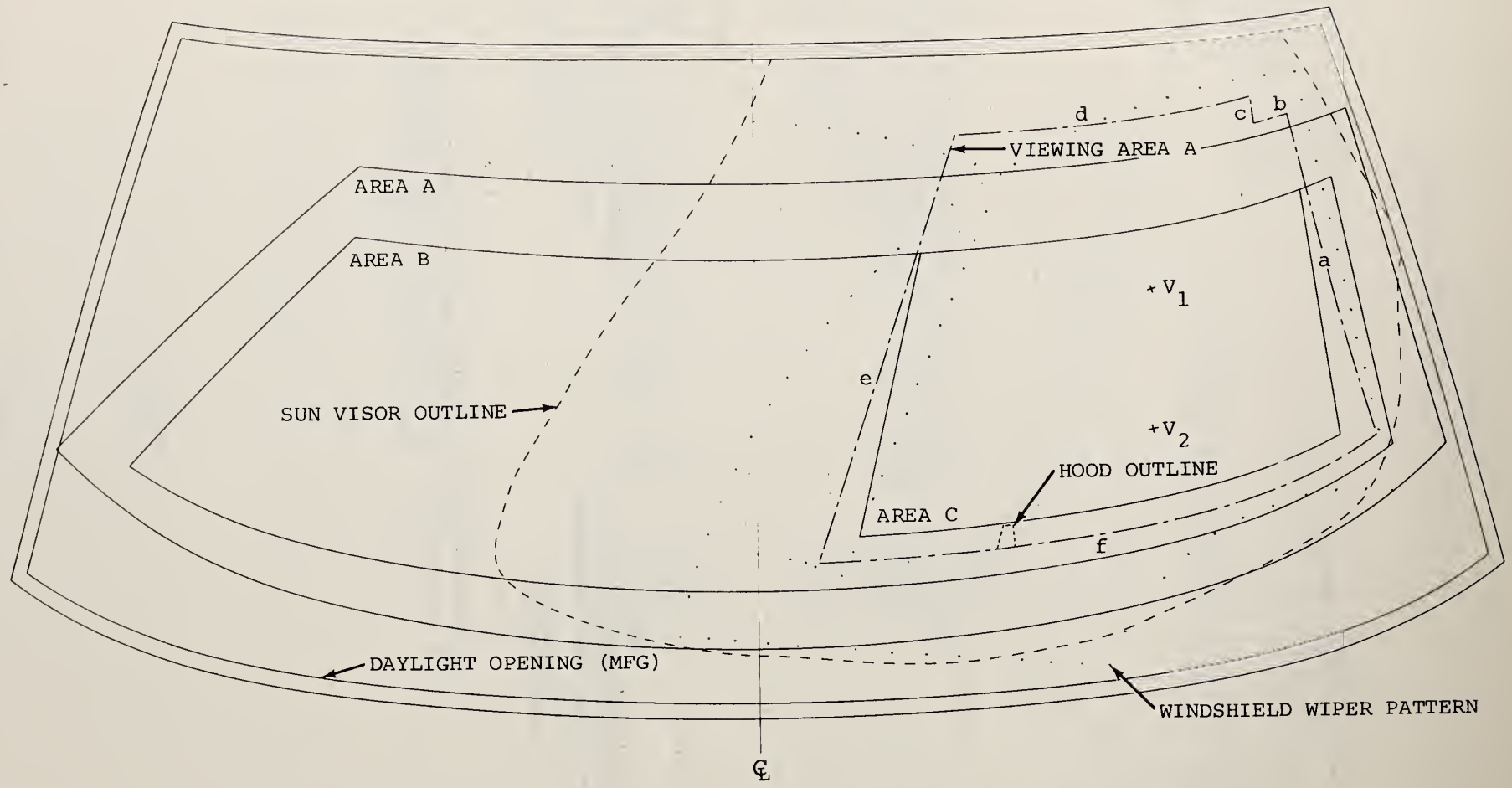
Zone: II

Obstruction	Right A Pillar		
Initial Sight to Outboard E - Rear Side	70°52'		
Adjusted Sight to Outboard E - Rear Side	30°00'		
Inboard E - Front Side	27°24'		
Angle to Bench Mark			
Obstruction Angle	2°36'		
Azimuth			

Explanations Pertinent to the Specific Measurements:



Plan View of Binocular Obstructions - Buick Regal.



Windshield Overlay Showing Relationship Between Critical Areas per FMVSS 104 and View Area A as Measured for This Vehicle - Buick Regal.

DATA SHEET 3

WINDSHIELD AREAS

VEHICLE:

MANUFACTURER General Motors YEAR 1978

MODEL Buick Regal BODY STYLE 2 Door

VIN 4K4738Z129301

VIEW AREA DIMENSIONAL MEASUREMENTS

Relative to Windshield Points

"A" Pillar to Side a 3.29

"A" Pillar to Side c 3.87

DLO Top of Windshield to Side d 3.14

DLO Bottom of Windshield to Side f 6.17

Relative to Critical A, B, C Areas

	A	B	C
Side a Leftward to	2.79	.62	-1.46
Side c Leftward to	3.90	2.84	1.47
Side e Rightward to	24.28	23.44	-.16
Side d Upward to	-1.65	-4.67	-4.67
Side f Downward to	3.28	.99	-1.06

Critical Areas (A, B, C) Relative to Windshield Points

	A	B	C
"A" Pillar to	.52	2.73	4.67
DLO Top of Windshield to	4.79	7.81	7.81
DLO Bottom of Windshield to	2.89	5.18	7.23

Left Front Three-Quarter View - 1978 Buick Regal 2-Door Sport Coupe.

Right Rear Three-Quarter View - 1978 Buick Regal 2-Door Sport Coupe.

APPENDIX B2 - BUICK SKYHAWK

DATA SHEET NO. 1 - VEHICLE DATA

VEHICLE:

MANUFACTURER General Motors YEAR 1978

MODEL Buick Skyhawk BODY STYLE 2 Door

VIN 4S07A8U416853 ODOMETER 33

BUILD DATE 6/78

SPECIAL OPTIONS

FRONT SEAT TYPE: SPECIFIED Bucket

TILT STEERING WHEEL? YES X NO

FRONT SEAT TRAVEL RANGE: SPECIFIED 6.12 in.

FRONT SEAT BACK ANGLE: SPECIFIED 26°

MEASURING POINT CORRECTIONS

	X (in.)	Z (in.)
P From Table 2	-1.64	--
P From Table 3	+0.34	-0.10
Total P	-1.30	-0.10
V From Table 3	+0.34	-0.10

MANUFACTURER'S REFERENCE POINTS FOR SRP

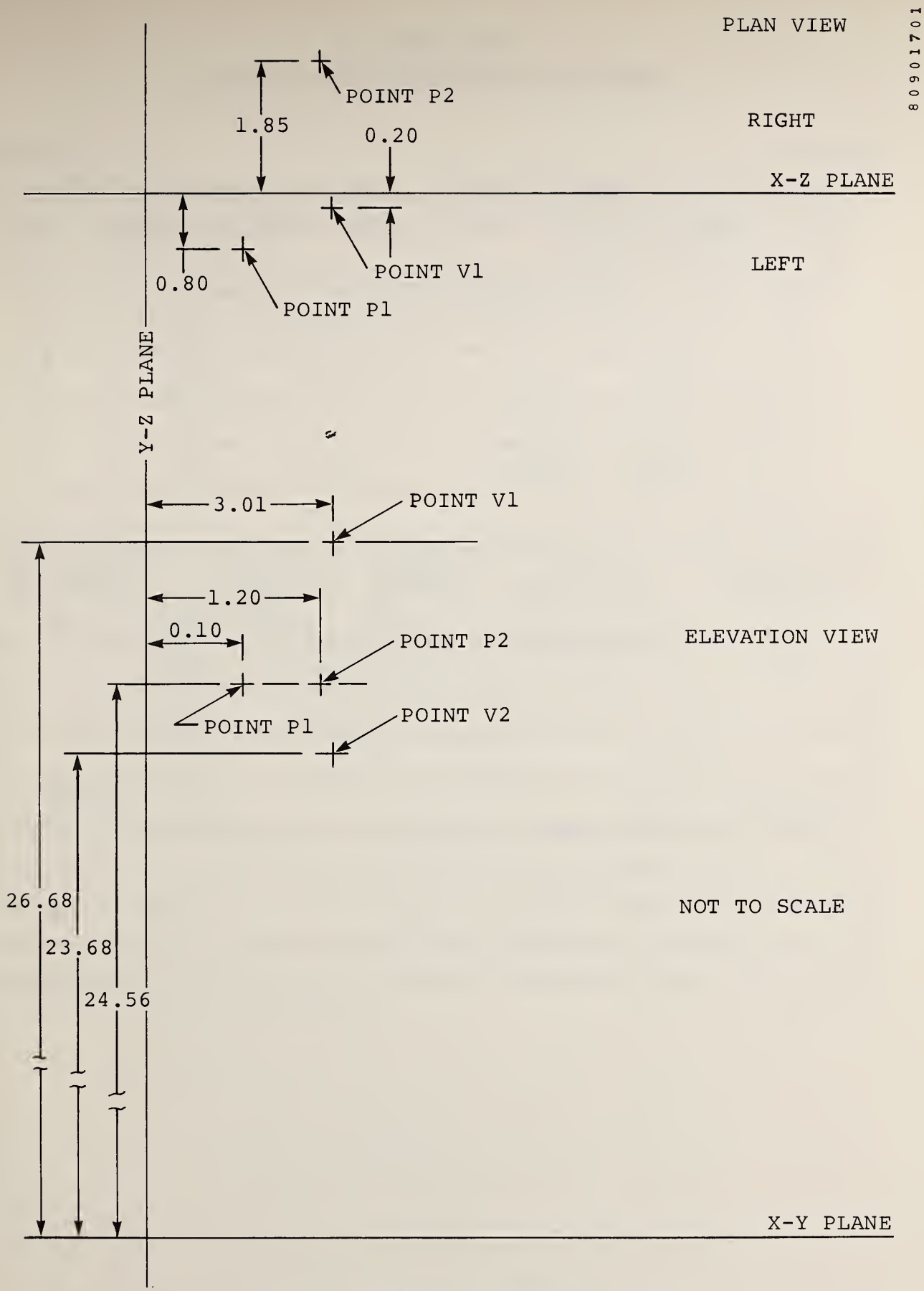
For X 14.32 in. from Front Seat Forward Anchor Hole

For Y 13.15 in. to Zero Y Plane W20

For Z 7.1 in. from Front Seat Forward Anchor Hole

MANUFACTURER'S DIMENSIONS FOR VEHICLE ATTITUDE AND SRP LOCATION

	From Axle Centerline	From Vehicle Centerline	Height Above Ground (Curb Weight)
Front Station	26 in. (Front Axle)	--	7.75 in.
Rear Station	16 in. (Rear Axle)	--	7.75 in.
SRP	--	13.15 in.	17.25 in.
"R" Point	--	13.15 in.	17.25 in.



Relationship of Reference Points -
1978 Buick Skyhawk 2-Door Hatchback Coupe.

DATA SHEET 2

MONOCULAR OBSTRUCTION ANGLE FROM V_1

VEHICLE:

MANUFACTURER General Motors YEAR 1978

MODEL Buick Skyhawk BODY STYLE 2 Door

VIN 4S07A8U416853

LOCATION OF "V" POINT RELATIVE TO THE "R" Point

	V_1	V_2
X	3.01	3.01
Y	-0.20	-0.20
Z	26.68	23.68

OBSTRUCTIONS: Zone I

Elevation	Obstruction	Left Angle	Right Angle	Obstruction Angle
V_1	Left A Pillar	320°09'	330°58'	10°49'

Total 10°49'

Explanations Pertinent to the Specific Measurements:

DATA SHEET 2

MONOCULAR OBSTRUCTION ANGLE FROM V_1

VEHICLE:

MANUFACTURER General Motors YEAR 1978

MODEL Buick Skyhawk BODY STYLE 2 Door

VIN 4S07A8U416853

LOCATION OF "V" POINT RELATIVE TO THE "R" Point

	V_1	V_2
X	3.01	3.01
Y	-0.20	-0.20
Z	26.68	23.68

OBSTRUCTIONS: Zone II

Elevation	Obstruction	Left Angle	Right Angle	Obstruction Angle
V_1	Rear View Mirror	33°12'	56°23'	23°11'
	Right A Pillar	63°35'	70°53'	7°18'

Total 30°29'

Explanations Pertinent to the Specific Measurements:

DATA SHEET 2

MONOCULAR OBSTRUCTION ANGLE FROM V_1

VEHICLE:

MANUFACTURER General Motors YEAR 1978

MODEL Buick Skyhawk BODY STYLE 2 Door

VIN 4S07A8U416853

LOCATION OF "V" POINT RELATIVE TO THE "R" Point

	V_1	V_2
X	3.01	3.01
Y	-0.20	-0.20
Z	26.68	23.68

OBSTRUCTIONS: Zone IV

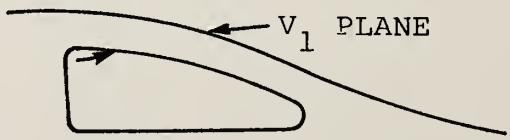
Elevation	Obstruction	Left Angle	Right Angle	Obstruction Angle
V_1	Right B Pillar	113°09'	123°50'	10°41'
	Right C Pillar	130°06'	141°11'	11°05'

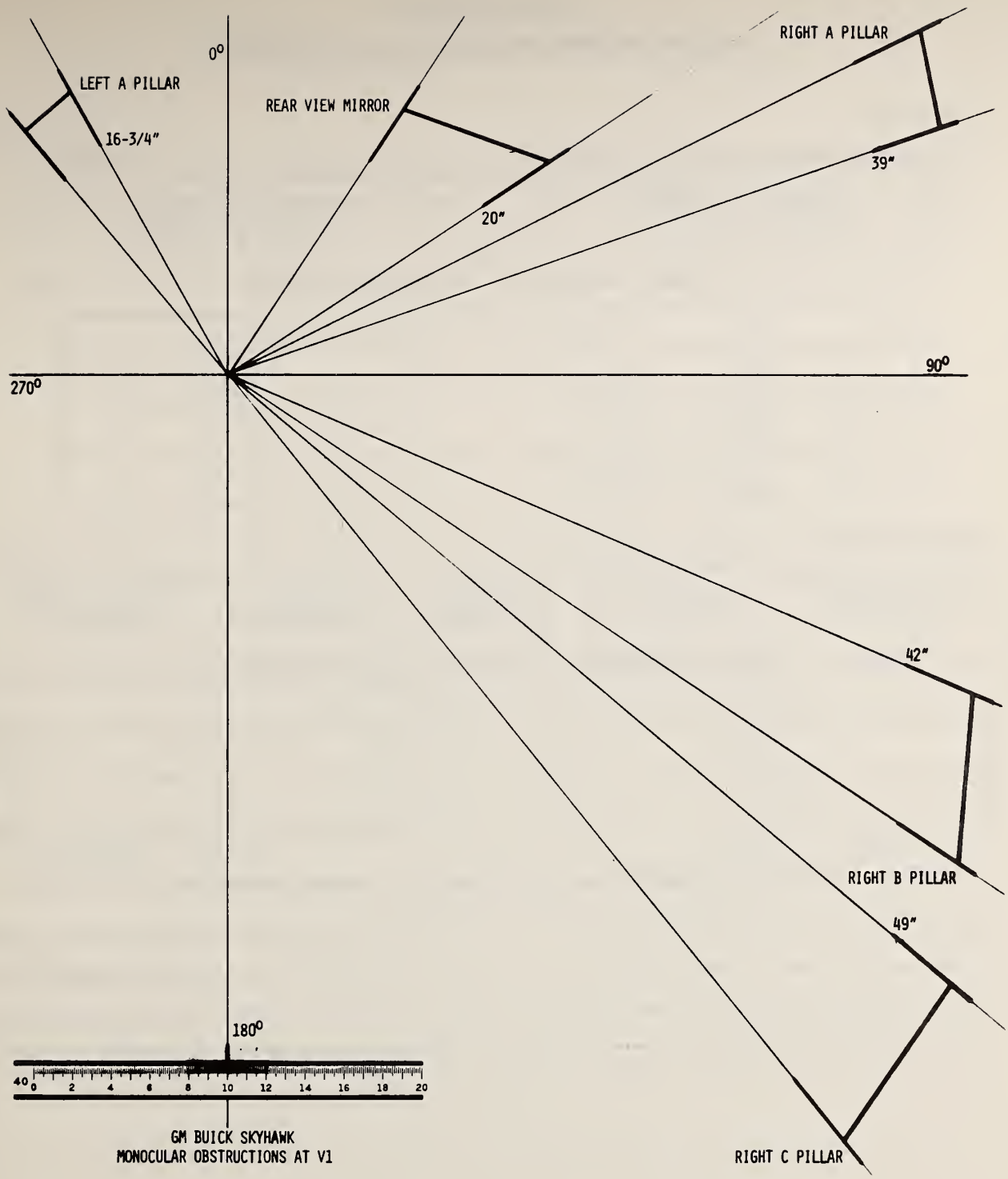
Total 21°46'

Explanations Pertinent to the Specific Measurements:

"C" Pillar appears wide because of the low slope angle. See sketch.

Sketch, Plan View





Plan View of Monocular Obstructions at V_1 - Buick Skyhawk.

DATA SHEET 2

MONOCULAR OBSTRUCTION ANGLE FROM V_2

VEHICLE:

MANUFACTURER General Motors YEAR 1978

MODEL Buick Skyhawk BODY STYLE 2 Door

VIN 4S07A8U416853

LOCATION OF "V" POINT RELATIVE TO THE "R" Point

	V_1	V_2
X	3.01	3.01
Y	-0.20	-0.20
Z	26.68	23.68

OBSTRUCTIONS: Zone I

Elevation	Obstruction	Left Angle	Right Angle	Obstruction Angle
V_2	Left A Pillar	322°50'	331°57'	9°07'

Total 9°07'

Explanations Pertinent to the Specific Measurements:

DATA SHEET 2

MONOCULAR OBSTRUCTION ANGLE FROM V_2

VEHICLE:

MANUFACTURER General Motors YEAR 1978

MODEL Buick Skyhawk BODY STYLE 2 Door

VIN 4S07A8U416853

LOCATION OF "V" POINT RELATIVE TO THE "R" Point

	V_1	V_2
X	3.01	3.01
Y	-0.20	-0.20
Z	26.68	23.68

OBSTRUCTIONS: Zone II

Elevation	Obstruction	Left Angle	Right Angle	Obstruction Angle
V_2	Right A Pillar	60°46'	67°12'	6°26'

Total 6°26'

Explanations Pertinent to the Specific Measurements:

DATA SHEET 2

MONOCULAR OBSTRUCTION ANGLE FROM V_2

VEHICLE:

MANUFACTURER General Motors YEAR 1978

MODEL Buick Skyhawk BODY STYLE 2 Door

VIN 4S07A8U416853

LOCATION OF "V" POINT RELATIVE TO THE "R" Point

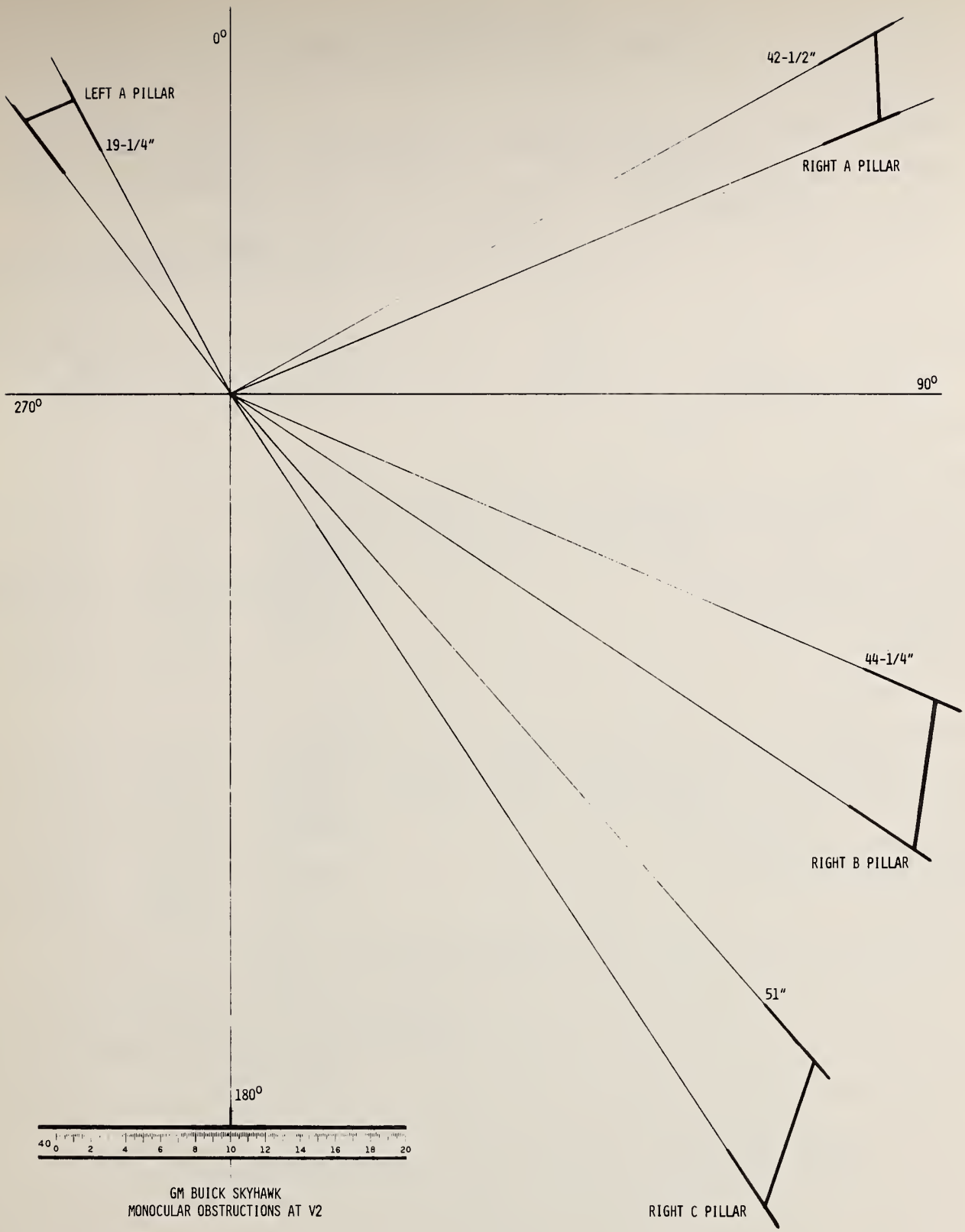
	V_1	V_2
X	3.01	3.01
Y	-0.20	-0.20
Z	26.68	23.68

OBSTRUCTIONS: Zone IV

Elevation	Obstruction	Left Angle	Right Angle	Obstruction Angle
V_2	Right B Pillar	113°22'	123°47'	10°25'
	Right C Pillar	138°55'	146°54'	7°59'

Total 18°24'

Explanations Pertinent to the Specific Measurements:



Plan View of Monocular Obstructions at V_2 - Buick Skyhawk.

DATA SHEET 4

BINOCULAR OBSTRUCTION ANGLES

VEHICLE:

MANUFACTURER General Motors YEAR 1978

MODEL Buick Skyhawk BODY STYLE 2 Door

VIN 4S07A8U416853

	Dimensions Relative "R" Point		
	X	Y	Z
P_1	0.10	-0.80	24.56
P_2	1.20	-1.85	24.56

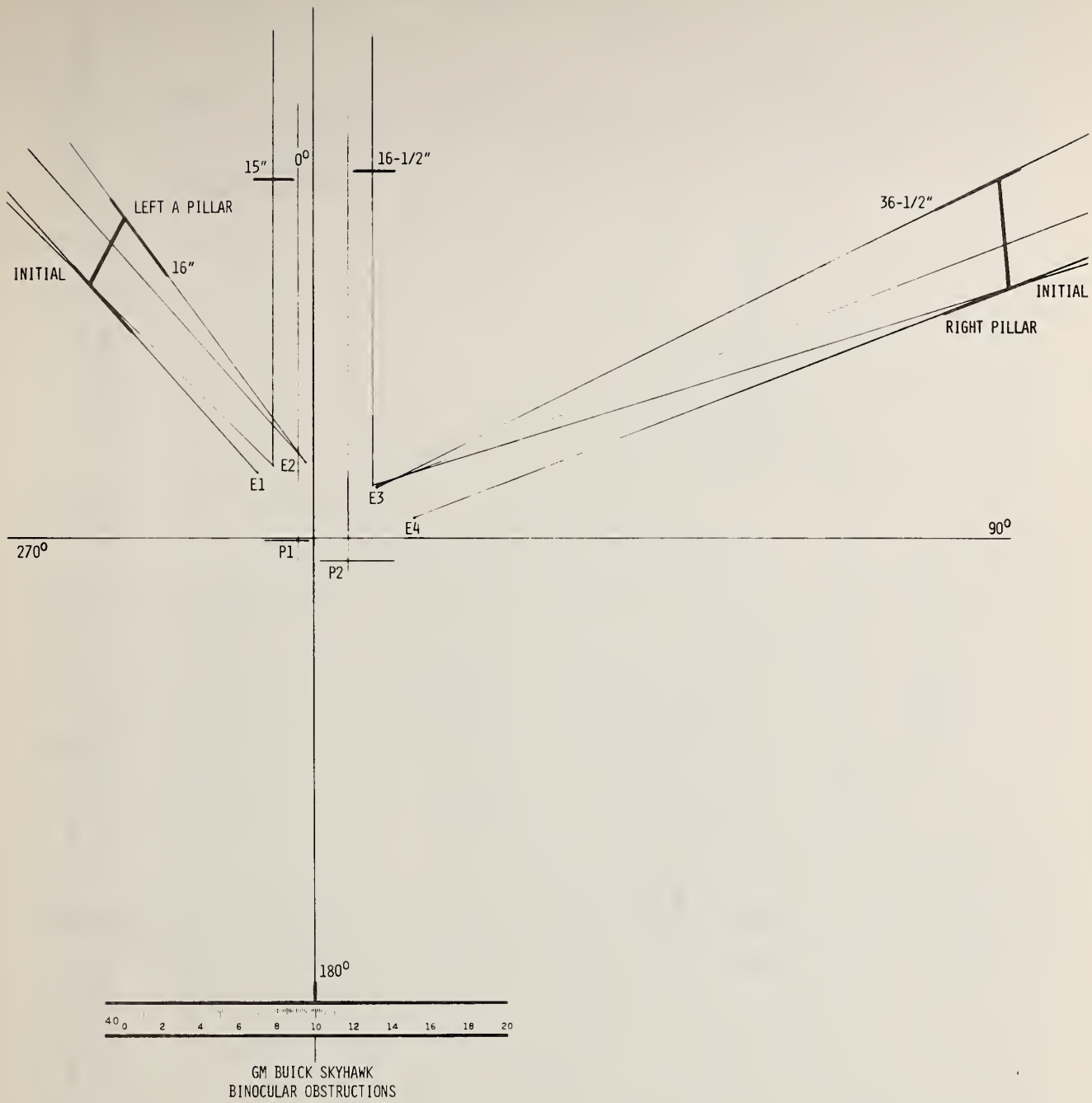
Zone: I

Obstruction	Left A Pillar		
Initial Sight to Outboard E - Rear Side	314°36'		
Adjusted Sight to Outboard E - Rear Side	330°27'		
Inboard E - Front Side	335°21'		
Angle to Bench Mark			
Obstruction Angle	4°54'		
Azimuth			

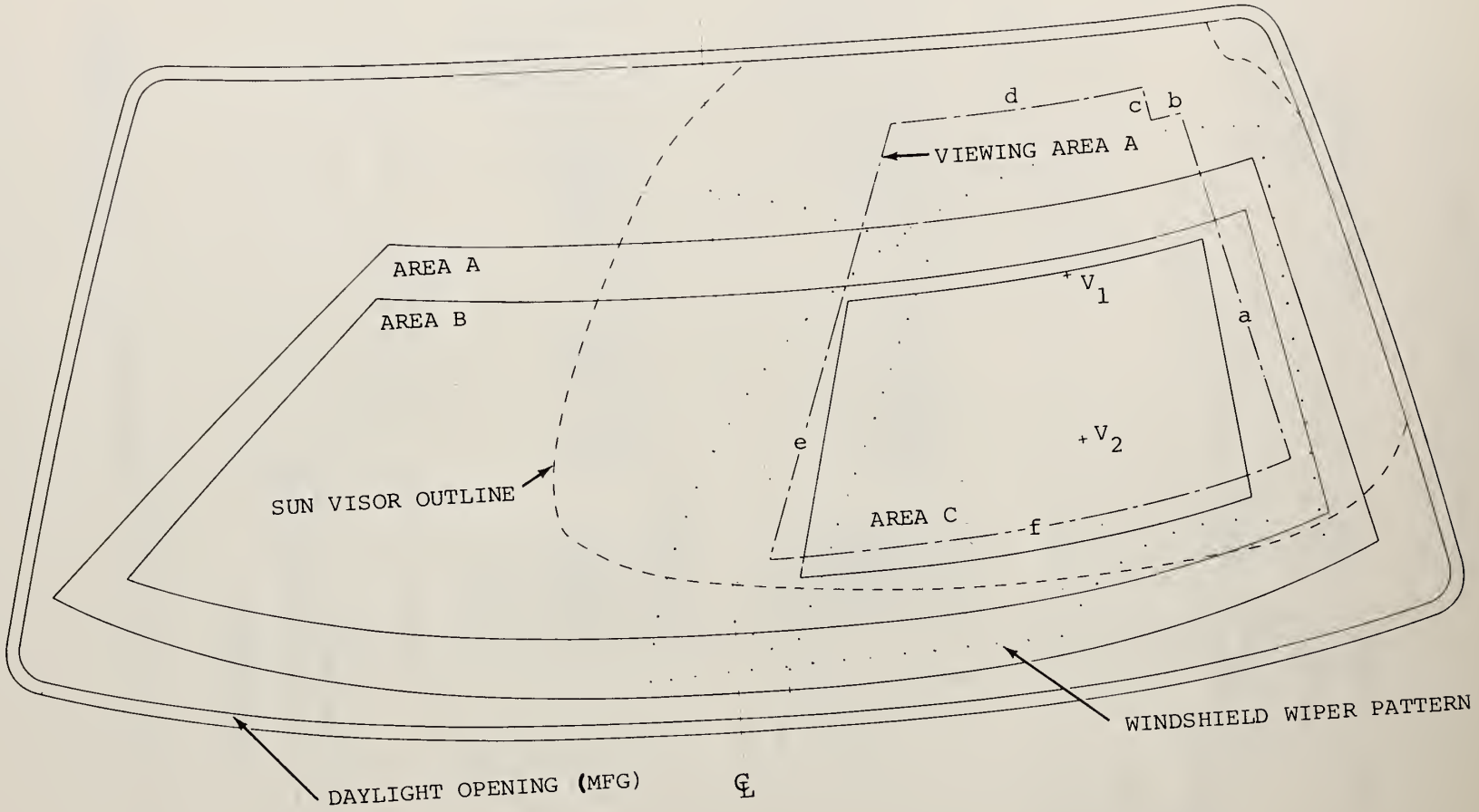
Zone: II

Obstruction	Right A Pillar		
Initial Sight to Outboard E - Rear Side	72°49'		
Adjusted Sight to Outboard E - Rear Side	29°12'		
Inboard E - Front Side	24°57'		
Angle to Bench Mark			
Obstruction Angle	4°15'		
Azimuth			

Explanations Pertinent to the Specific Measurements:



Plan View of Binocular Obstructions - Buick Skyhawk.



Windshield Overlay Showing Relationship Between Critical Areas per FMVSS 104 and View Area A as Measured for This Vehicle - Buick Skyhawk.

DATA SHEET 3

WINDSHIELD AREAS

VEHICLE:

MANUFACTURER General Motors YEAR 1978

MODEL Buick Skyhawk BODY STYLE 2 Door

VIN 4S07A8U416853

VIEW AREA DIMENSIONAL MEASUREMENTS

Relative to Windshield Points

"A" Pillar to Side a 4.69

"A" Pillar to Side c 5.33

DLO Top of Windshield to Side d 2.56

DLO Bottom of Windshield to Side f 6.35

Relative to Critical A, B, C Areas

	A	B	C
Side a Leftward to	2.24	.88	-.76
Side c Leftward to	3.42	2.64	.77
Side e Rightward to	18.19	18.06	-.26
Side d Upward to	-3.88	-5.96	-6.53
Side f Downward to	+5.10	+2.82	+.87

Critical Areas (A, B, C) Relative to Windshield Points

	A	B	C
"A" Pillar to	2.43	3.93	6.55
DLO Top of Windshield to	6.44	8.52	9.08
DLO Bottom of Windshield to	1.25	3.52	5.48

Left Front Three-Quarter View - 1978 Buick Skyhawk 2-Door Hatchback Coupe.

Right Rear Three-Quarter View - 1978 Buick Skyhawk 2-Door Hatchback Coupe.

APPENDIX B3 - CHEVROLET CAMARO

DATA SHEET NO. 1 - VEHICLE DATA

VEHICLE:

MANUFACTURER General Motors YEAR 1978

MODEL Chevrolet Camaro BODY STYLE 2 Door

VIN 1Q87V8L517885 ODOMETER 5005

BUILD DATE 9/77

SPECIAL OPTIONS

FRONT SEAT TYPE: SPECIFIED Bucket

TILT STEERING WHEEL? YES X NO

FRONT SEAT TRAVEL RANGE: SPECIFIED 4.75 in.

FRONT SEAT BACK ANGLE: SPECIFIED 26°

MEASURING POINT CORRECTIONS

	X (in.)	Z (in.)
P From Table 2	-0.88	--
P From Table 3	+0.34	-0.10
Total P	-0.54	-0.10
V From Table 3	+0.34	-0.10

MANUFACTURER'S REFERENCE POINTS FOR SRP

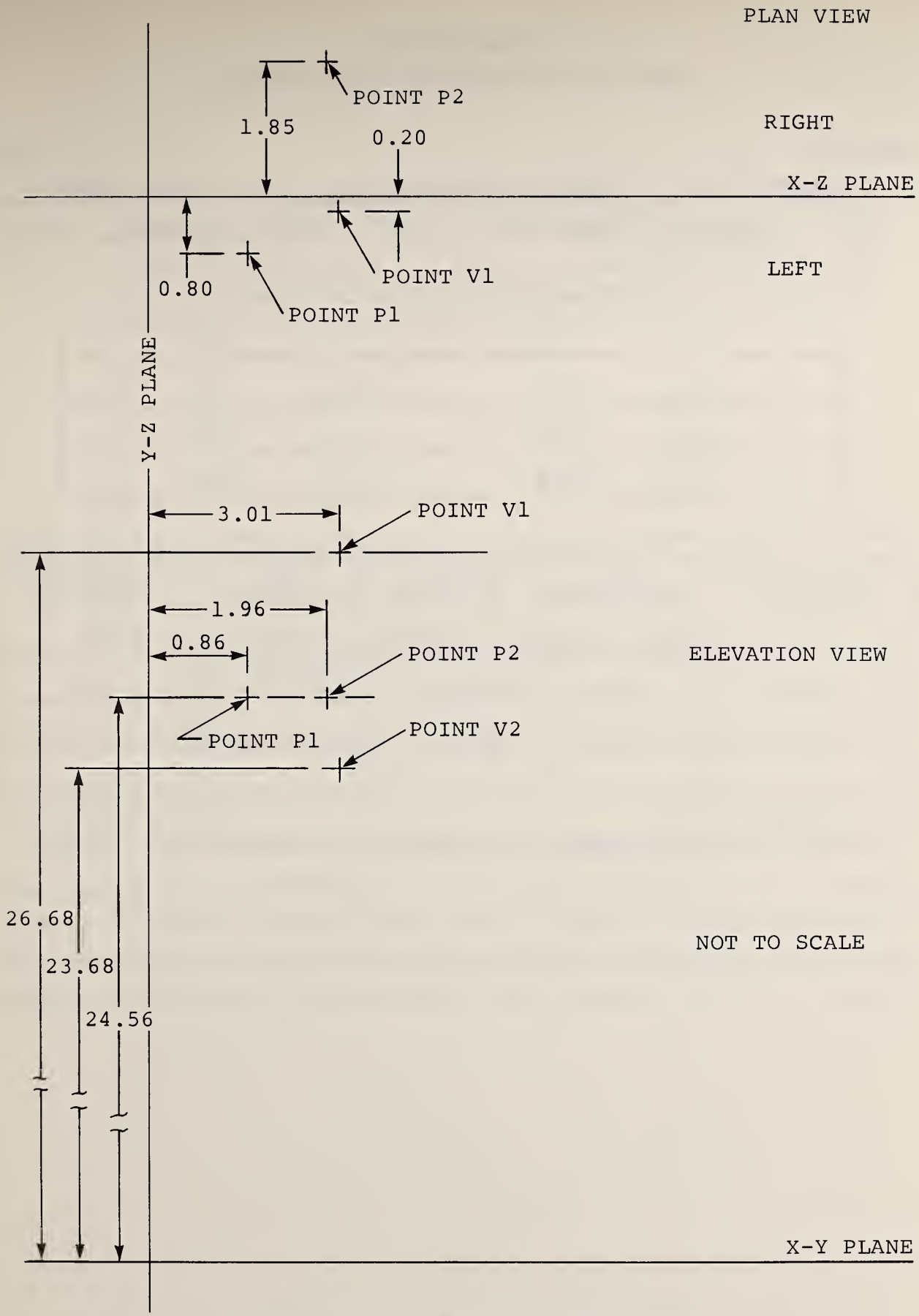
For X -0.07(forward) from Front Seat Rear Anchor Hole

For Y -14.55 to Zero Y Plane

For Z 8.5 from Front Seat Rear Anchor Hole

MANUFACTURER'S DIMENSIONS FOR VEHICLE ATTITUDE AND SRP LOCATION

	From Axle Centerline	From Vehicle Centerline	Height Above Ground Curb Weight
Front Station	36.3 in. (Front Axle)	--	8.2 in.
Rear Station	20.0 in. (Rear Axle)	--	7.85 in.
SRP	--	-14.55 in.	16.75 in.
"R" Point	--	-15.49 in.	16.75 in.



Relationship of Reference Points -
1978 Chevrolet Camaro 2-Door Sport Coupe .

DATA SHEET 2

MONOCULAR OBSTRUCTION ANGLE FROM V_1

VEHICLE:

MANUFACTURER General Motors YEAR 1978

MODEL Chevrolet Camaro BODY STYLE 2 Door

VIN 1Q87V8L517885

LOCATION OF "V" POINT RELATIVE TO THE "R" Point

	V_1	V_2
X	3.01	3.01
Y	-0.20	-0.20
Z	26.68	23.68

OBSTRUCTIONS: Zone I

Elevation V_1	Obstruction	Left Angle	Right Angle	Obstruction Angle
	Left A Pillar	328°46'	337°22'	8°36'

Total 8°36'

Explanations Pertinent to the Specific Measurements:

DATA SHEET 2

MONOCULAR OBSTRUCTION ANGLE FROM V_1

VEHICLE:

MANUFACTURER General Motors YEAR 1978

MODEL Chevrolet Camaro BODY STYLE 2 Door

VIN 1Q87V8L517885

LOCATION OF "V" POINT RELATIVE TO THE "R" Point

	V_1	V_2
X	3.01	3.01
Y	-0.20	-0.20
Z	26.68	23.68

OBSTRUCTIONS: Zone II

Elevation	Obstruction	Left Angle	Right Angle	Obstruction Angle
V_1	Inside Rear View Mirror	28°22'	50°52'	22°30'
	Right A Pillar	63°55'	68°04'	4°09'

Total 26°39'

Explanations Pertinent to the Specific Measurements:

DATA SHEET 2

MONOCULAR OBSTRUCTION ANGLE FROM V_1

VEHICLE:

MANUFACTURER General Motors YEAR 1978

MODEL Chevrolet Camaro BODY STYLE 2 Door

VIN 1Q87V8L517885

LOCATION OF "V" POINT RELATIVE TO THE "R" Point

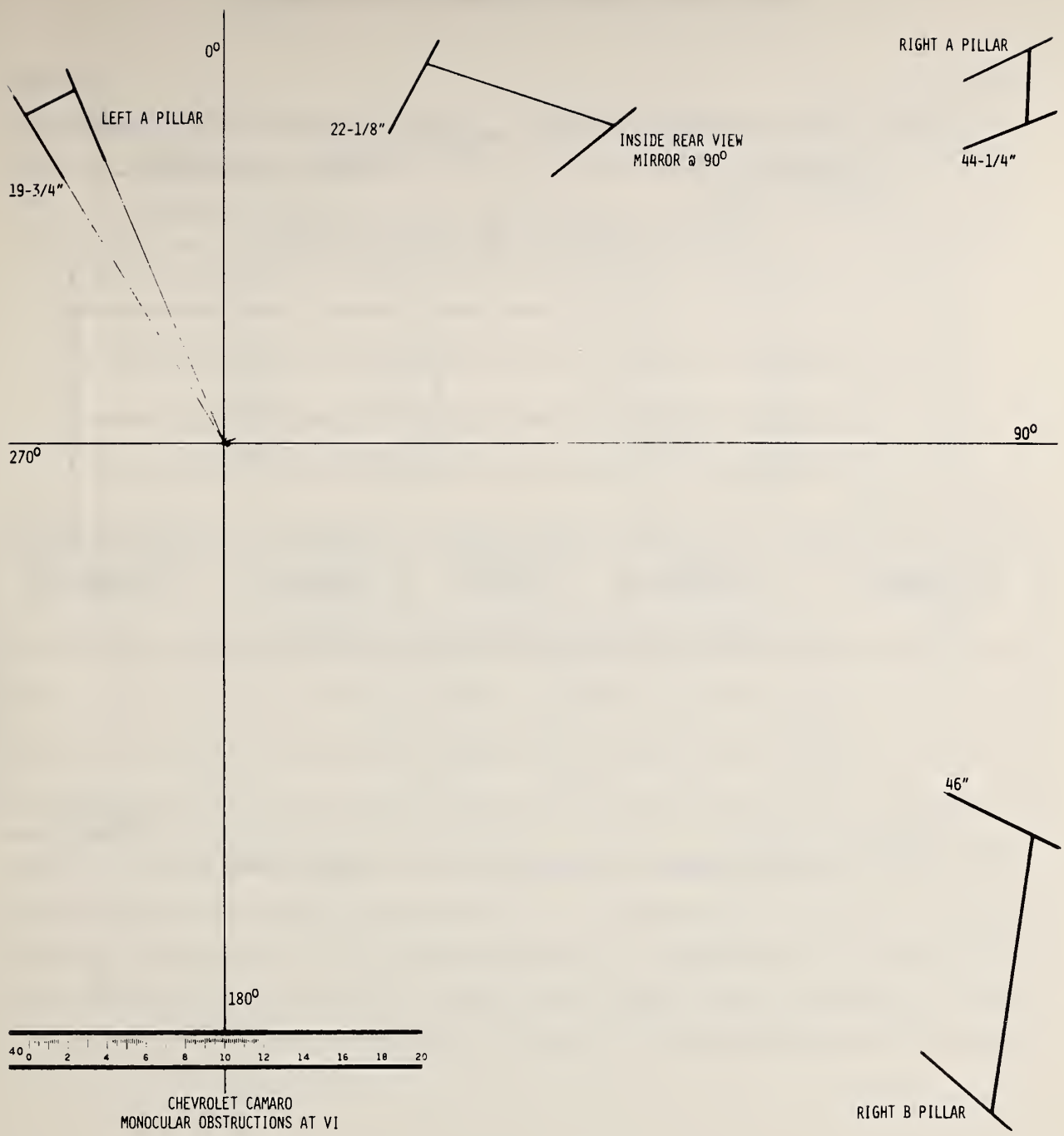
	V_1	V_2
X	3.01	3.01
Y	-0.20	-0.20
Z	26.68	23.68

OBSTRUCTIONS: Zone IV

Elevation	Obstruction	Left Angle	Right Angle	Obstruction Angle
V_1	Right B Pillar	115°56'	131°03'	15°07'

Total 15°07'

Explanations Pertinent to the Specific Measurements:



Plan View of Monocular Obstructions at V_1 - Chevrolet Camaro.

DATA SHEET 2

MONOCULAR OBSTRUCTION ANGLE FROM V_2

VEHICLE:

MANUFACTURER General Motors YEAR 1978

MODEL Chevrolet Camaro BODY STYLE 2 Door

VIN 1Q87V8L517885

LOCATION OF "V" POINT RELATIVE TO THE "R" Point

	V_1	V_2
X	3.01	3.01
Y	-0.20	-0.20
Z	26.68	23.68

OBSTRUCTIONS: Zone I

Elevation	Obstruction	Left Angle	Right Angle	Obstruction Angle
V_2	Left A Pillar	328°46'	335°58'	7°12'

Total 7°12'

Explanations Pertinent to the Specific Measurements:

DATA SHEET 2

MONOCULAR OBSTRUCTION ANGLE FROM V_2

VEHICLE:

MANUFACTURER General Motors YEAR 1978

MODEL Chevrolet Camaro BODY STYLE 2 Door

VIN 1Q87V8L517885

LOCATION OF "V" POINT RELATIVE TO THE "R" Point

	V_1	V_2
X	3.01	3.01
Y	-0.20	-0.20
Z	26.68	23.68

OBSTRUCTIONS: Zone II

Elevation	Obstruction	Left Angle	Right Angle	Obstruction Angle
V_2	Right A Pillar	61°48'	65°45'	3°57'

Total 3°57'

Explanations Pertinent to the Specific Measurements:

DATA SHEET 2

MONOCULAR OBSTRUCTION ANGLE FROM V_2

VEHICLE:

MANUFACTURER General Motors YEAR 1978

MODEL Chevrolet Camaro BODY STYLE 2 Door

VIN 1Q87V8L517885

LOCATION OF "V" POINT RELATIVE TO THE "R" Point

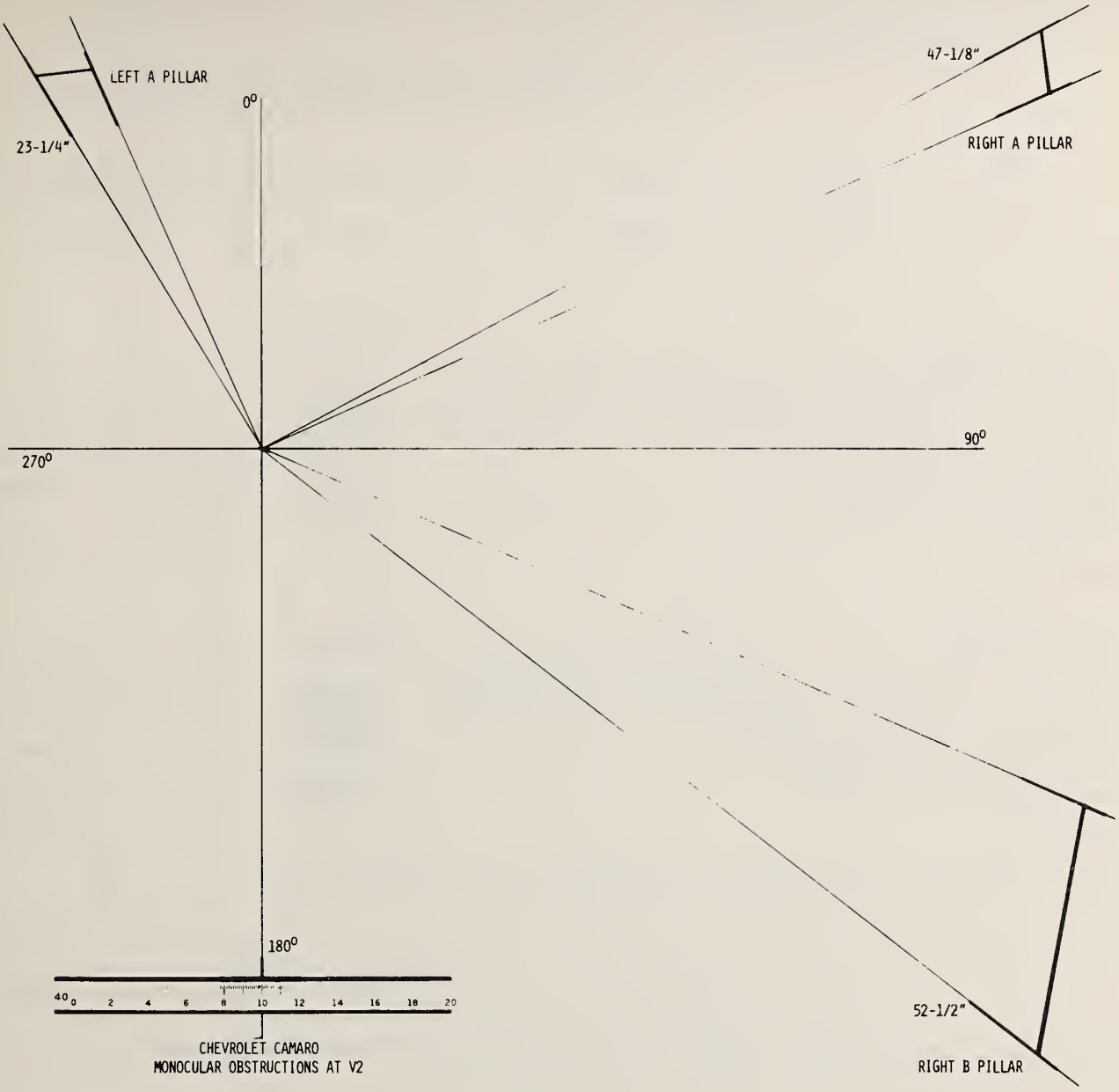
	V_1	V_2
X	3.01	3.01
Y	-0.20	-0.20
Z	26.68	23.68

OBSTRUCTIONS: Zone IV

Elevation	Obstruction	Left Angle	Right Angle	Obstruction Angle
V_2	Right B Pillar	113°22'	127°59'	14°37'

Total 14°37'

Explanations Pertinent to the Specific Measurements:



Plan View of Monocular Obstructions at V_2 - Chevrolet Camaro.

DATA SHEET 4

BINOCULAR OBSTRUCTION ANGLES

VEHICLE:

MANUFACTURER General Motors YEAR 1978

MODEL Chevrolet Camaro BODY STYLE 2 Door

VIN 1Q87V8L517885

	Dimensions Relative "R" Point		
	X	Y	Z
P_1	0.86	0.80	24.56
P_2	1.96	1.85	24.56

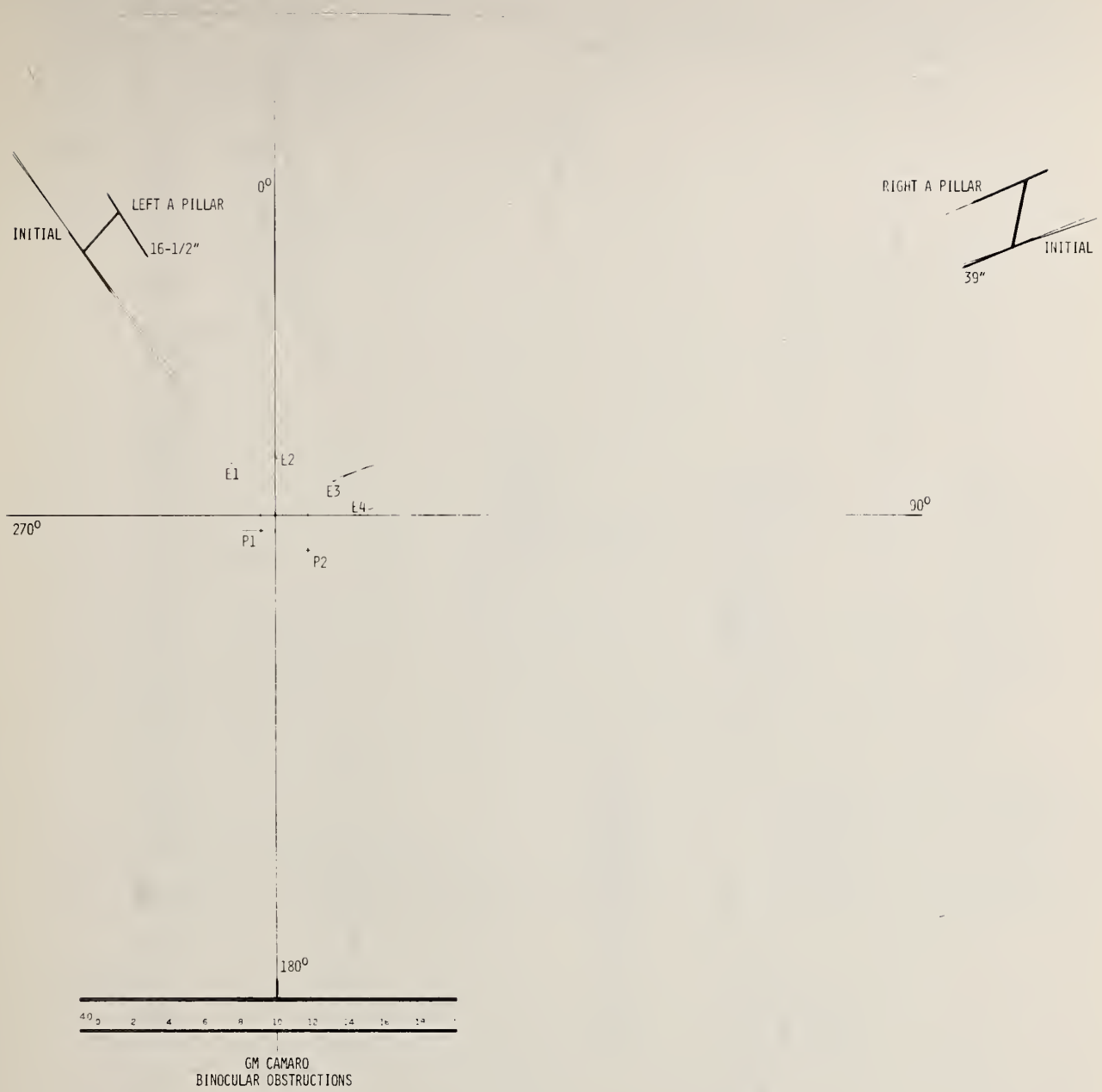
Zone: I

Obstruction	Left A Pillar		
Initial Sight to Outboard E - Rear Side	323°49'		
Adjusted Sight to Outboard E - Rear Side	330°00'		
Inboard E - Front Side	332°33'		
Angle to Bench Mark			
Obstruction Angle	2°33'		
Azimuth			

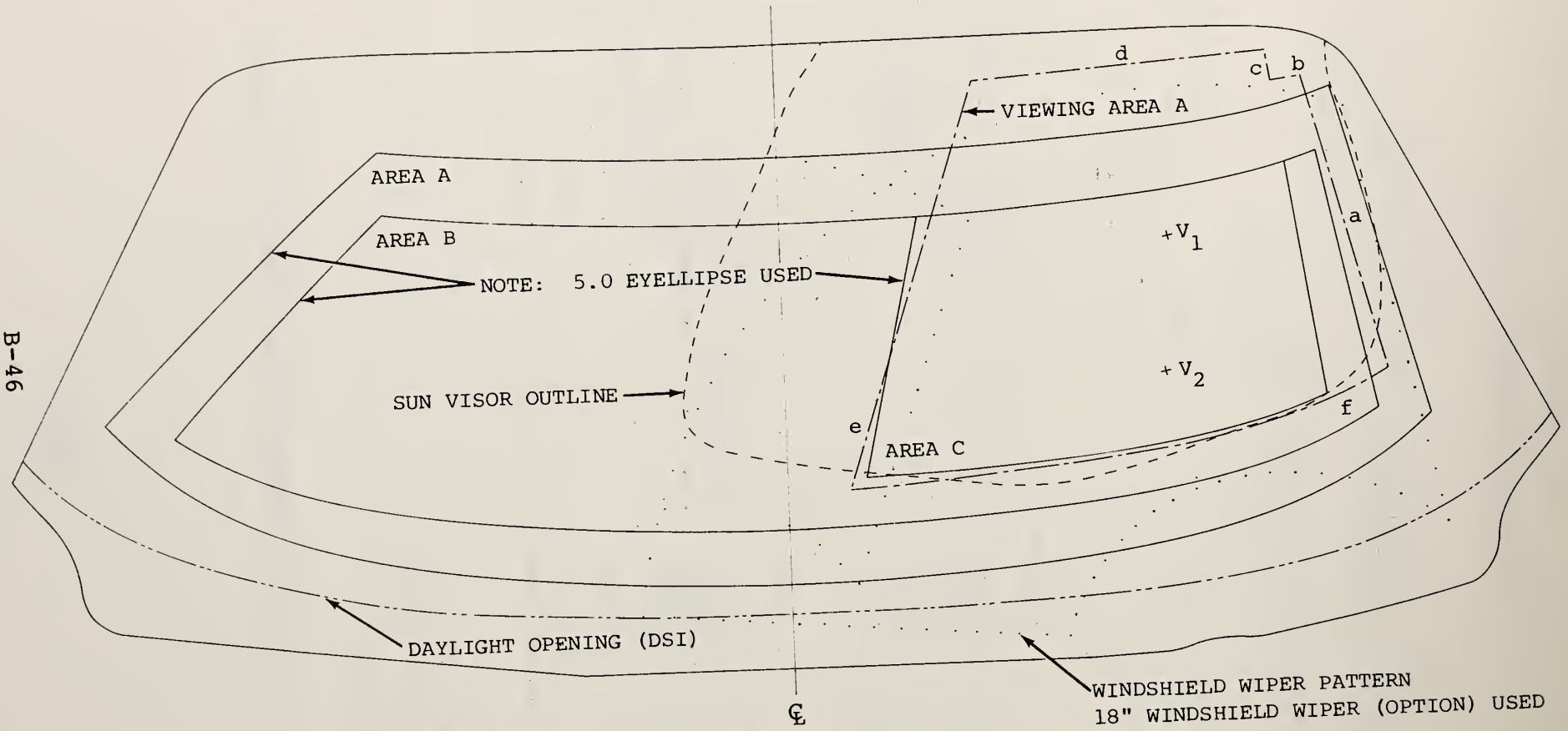
Zone: II

Obstruction	Right A Pillar		
Initial Sight to Outboard E - Rear Side	70°49'		
Adjusted Sight to Outboard E - Rear Side	30°00'		
Inboard E - Front Side	28°24'		
Angle to Bench Mark			
Obstruction Angle	1°36'		
Azimuth			

Explanations Pertinent to the Specific Measurements:



Plan View of Binocular Obstructions - Chevrolet Camaro.



Windshield Overlay Showing Relationship Between Critical Areas per FMVSS 104 and View Area A as Measured for This Vehicle - Chevrolet Camaro.

DATA SHEET 3

WINDSHIELD AREAS

VEHICLE:

MANUFACTURER General Motors YEAR 1978

MODEL Chevrolet Camaro Body Style 2 Door

VIN 1Q87V8L517885

VIEW AREA DIMENSIONAL MEASUREMENTS

Relative to Windshield Points

"A" Pillar to Side a 5.00

"A" Pillar to Side c 2.71

DLO Top of Windshield to Side d 1.51

DLO Bottom of Windshield to Side f 5.73

Relative to Critical A, B, C Areas

	A	B	C
Side a Leftward to	1.20	-0.79	-2.77
Side c Leftward to	2.40	1.30	+0.06
Side e Rightward to	24.00	22.96	-0.63
Side d Upward to	-2.76	-5.44	-5.44
Side f Downward to	3.96	1.73	-0.19

Critical Areas (A, B, C) Relative to Windshield Points

	A	B	C
"A" Pillar to	3.80	5.79	7.81
DLO Top of Windshield to	4.27	6.95	6.95
DLO Bottom of Windshield to	1.77	4.00	5.92

Left Front Three-Quarter View - 1978 Chevrolet Camaro 2-Door Sport Coupe.

Right Rear Three-Quarter View - 1978 Chevrolet Camaro 2-Door Sport Coupe.

APPENDIX B4 - CHEVROLET CAPRICE

DATA SHEET NO. 1 - VEHICLE DATA

VEHICLE:

MANUFACTURER General Motors YEAR 1978

MODEL Chevrolet Caprice BODY STYLE 4 Door

VIN 1N69U8S128642 ODOMETER 6685

BUILD DATE 9/77

SPECIAL OPTIONS

FRONT SEAT TYPE: SPECIFIED Bench

TILT STEERING WHEEL? YES X NO

FRONT SEAT TRAVEL RANGE: SPECIFIED 6.02 in.

FRONT SEAT BACK ANGLE: SPECIFIED 26.5°

MEASURING POINT CORRECTIONS

	X (in.)	Z (in.)
P From Table 2	-1.64	--
P From Table 3	+0.68	-0.21
Total P	-.96	-0.21
V From Table 3	+0.68	-0.21

MANUFACTURER'S REFERENCE POINTS FOR SRP

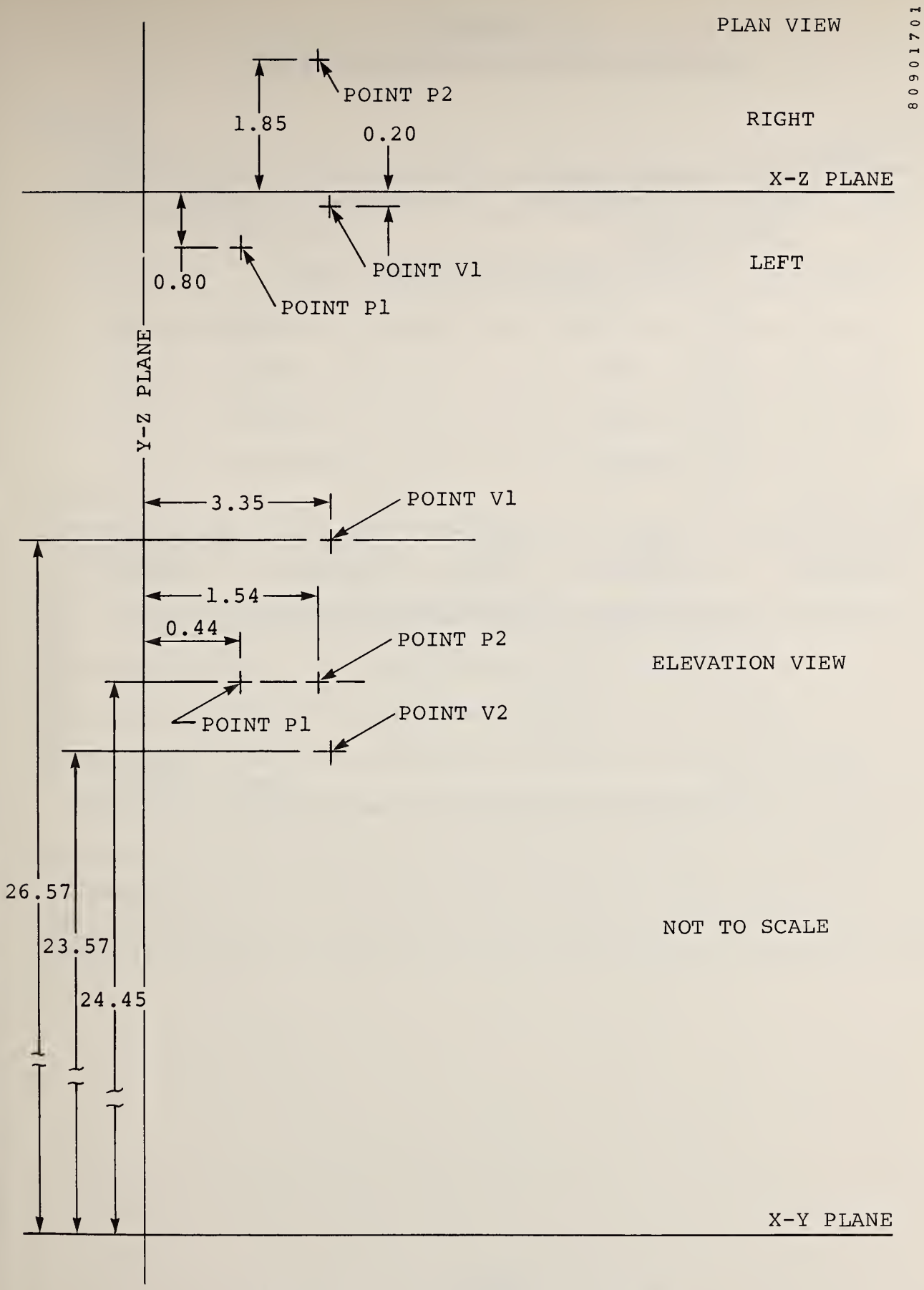
For X 13.56 in. from Front Seat Forward Anchor Hole

For Y 15.00 in. to Zero Y Plane W20

For Z 7.89 in. from Front Seat Forward Anchor Hole

MANUFACTURER'S DIMENSIONS FOR VEHICLE ATTITUDE AND SRP LOCATION

	From Axle Centerline	From Vehicle Centerline	Height Above Ground at Curb Weight
Front Station	31.50 in. (Front Axle)	NA	10.51 in.
Rear Station	24.61 in. (Rear Axle)	NA	10.63 in.
SRP	NA	15.00 in.	20.25 in.
"R" Point	NA	16.95 in.	20.25 in.



Relationship of Reference Points -
1978 Chevrolet Caprice 4-Door Sedan.

DATA SHEET 2

MONOCULAR OBSTRUCTION ANGLE FROM V_1

VEHICLE:

MANUFACTURER General Motors YEAR 1978

MODEL Chevrolet Caprice BODY STYLE 4 Door

VIN 1N69U8S128642

LOCATION OF "V" POINT RELATIVE TO THE "R" Point

	V_1	V_2
X	3.35	3.35
Y	-0.20	-0.20
Z	26.57	23.57

OBSTRUCTIONS: Zone I

Elevation	Obstruction	Left Angle	Right Angle	Obstruction Angle
V_1	Left A Pillar	327°50'	335°30'	7°40'

Total 7°40'

Explanations Pertinent to the Specific Measurements:

DATA SHEET 2

MONOCULAR OBSTRUCTION ANGLE FROM V_1

VEHICLE:

MANUFACTURER General Motors YEAR 1978

MODEL Chevrolet Caprice BODY STYLE 4 Door

VIN 1N69U8S128642

LOCATION OF "V" POINT RELATIVE TO THE "R" Point

	V_1	V_2
X	3.35	3.35
Y	-0.20	-0.20
Z	26.57	23.57

OBSTRUCTIONS: Zone II

Elevation	Obstruction	Left Angle	Right Angle	Obstruction Angle
V_1	Right A Pillar	61°55'	67°03'	5°08'

Total 5°08'

Explanations Pertinent to the Specific Measurements:

DATA SHEET 2

MONOCULAR OBSTRUCTION ANGLE FROM V_1

VEHICLE:

MANUFACTURER General Motors YEAR 1978

MODEL Chevrolet Caprice BODY STYLE 4 Door

VIN 1N69U8S128642

LOCATION OF "V" POINT RELATIVE TO THE "R" Point

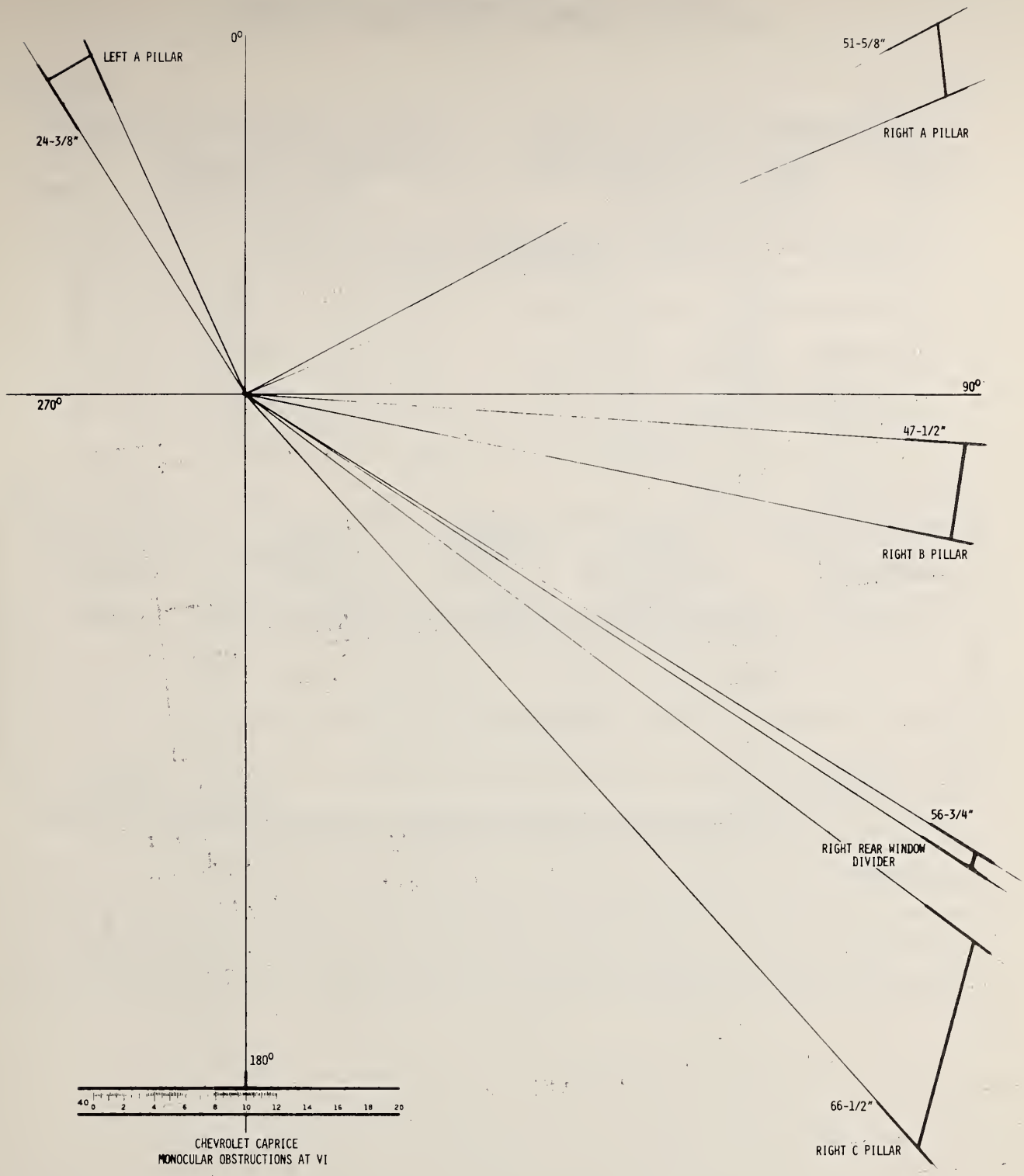
	V_1	V_2
X	3.35	3.35
Y	-0.20	-0.20
Z	26.57	23.57

OBSTRUCTIONS: Zone IV

Elevation	Obstruction	Left Angle	Right Angle	Obstruction Angle
V_1	Right B Pillar	94°01'	101°41'	7°40'
	Rear Window Divider	122°04'	123°17'	1°13'
	Right C Pillar	126°56'	138°15'	11°19'

Total 20°12'

Explanations Pertinent to the Specific Measurements:



Plan View of Monocular Obstructions at V_1 - Chevrolet Caprice.

DATA SHEET 2

MONOCULAR OBSTRUCTION ANGLE FROM V_2

VEHICLE:

MANUFACTURER General Motors YEAR 1978

MODEL Chevrolet Caprice BODY STYLE 4 Door

VIN 1N69U8S128642

LOCATION OF "V" POINT RELATIVE TO THE "R" Point

	V_1	V_2
X	3.35	3.35
Y	-0.20	-0.20
Z	26.57	23.57

OBSTRUCTIONS: Zone I

Elevation	Obstruction	Left Angle	Right Angle	Obstruction Angle
V_2	Left A Pillar	329°31'	336°00'	6°29'

Total 6°29'

Explanations Pertinent to the Specific Measurements:

DATA SHEET 2

MONOCULAR OBSTRUCTION ANGLE FROM V_2

VEHICLE:

MANUFACTURER General Motors YEAR 1978

MODEL Chevrolet Caprice BODY STYLE 4 Door

VIN 1N69U8S128642

LOCATION OF "V" POINT RELATIVE TO THE "R" Point

	V_1	V_2
X	3.35	3.35
Y	-0.20	-0.20
Z	26.57	23.57

OBSTRUCTIONS: Zone II

Elevation	Obstruction	Left Angle	Right Angle	Obstruction Angle
V_2	Right A Pillar	59°21'	63°59'	4°38'

Total 4°38'

Explanations Pertinent to the Specific Measurements:

DATA SHEET 2

MONOCULAR OBSTRUCTION ANGLE FROM V_2

VEHICLE:

MANUFACTURER General Motors YEAR 1978

MODEL Chevrolet Caprice BODY STYLE 4 Door

VIN 1N69U8S128642

LOCATION OF "V" POINT RELATIVE TO THE "R" Point

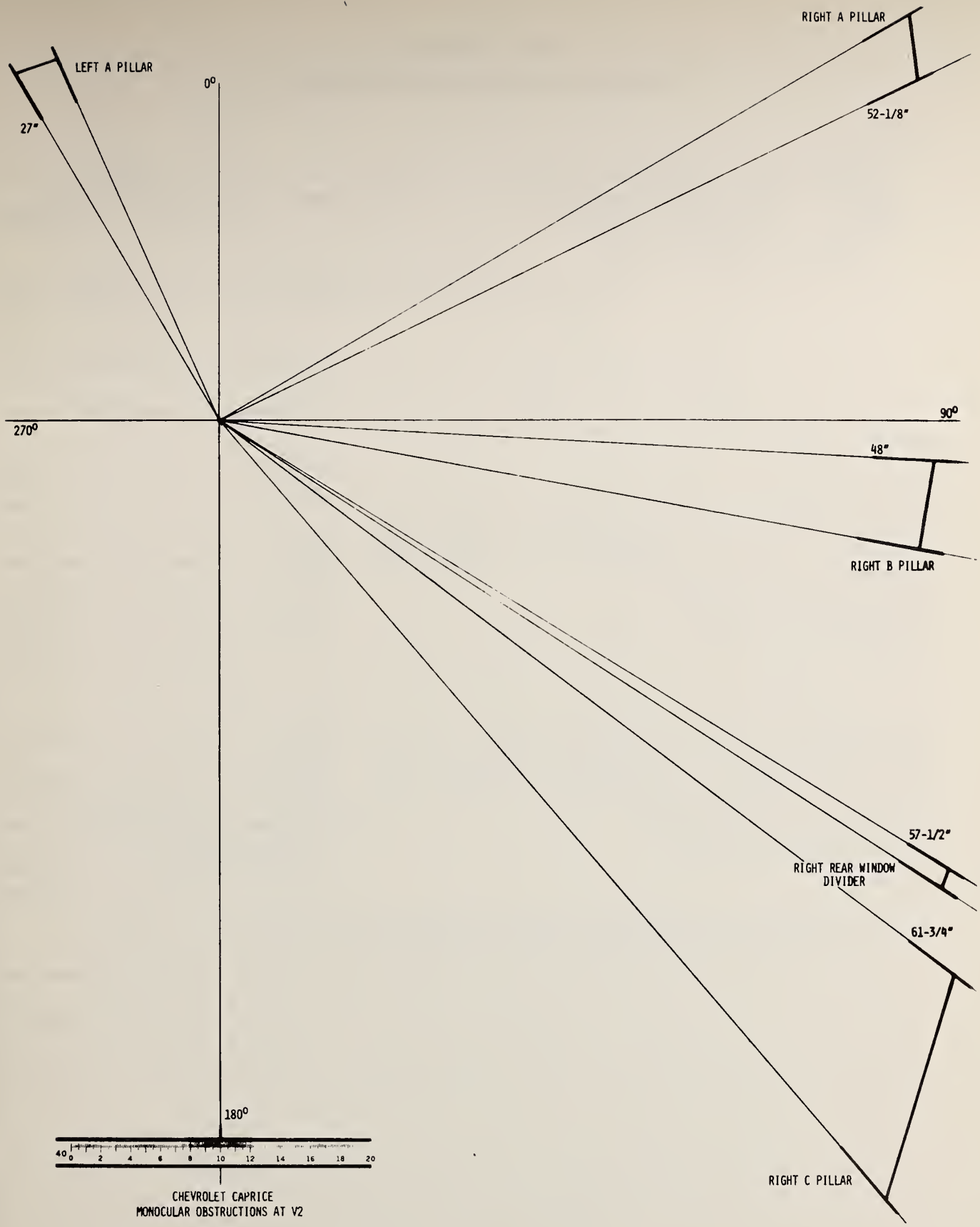
	V_1	V_2
X	3.35	3.35
Y	-0.20	-0.20
Z	26.57	23.57

OBSTRUCTIONS: Zone IV

Elevation	Obstruction	Left Angle	Right Angle	Obstruction Angle
V_2	Right B Pillar	93°11'	100°36'	7°25'
	Rear Window Divider	121°46'	122°55'	1°09'
	Right C Pillar	127°07'	139°31'	12°24'

Total 20°58'

Explanations Pertinent to the Specific Measurements:



Plan View of Monocular Obstructions at V_2 - Chevrolet Caprice.

DATA SHEET 4

BINOCULAR OBSTRUCTION ANGLES

VEHICLE:

MANUFACTURER General Motors YEAR 1978

MODEL Chevrolet Caprice BODY STYLE 4 Door

VIN 1N69U8S128642

	Dimensions Relative to "R" Point		
	X	Y	Z
P_1	0.44	-0.80	24.45
P_2	1.54	1.85	24.45

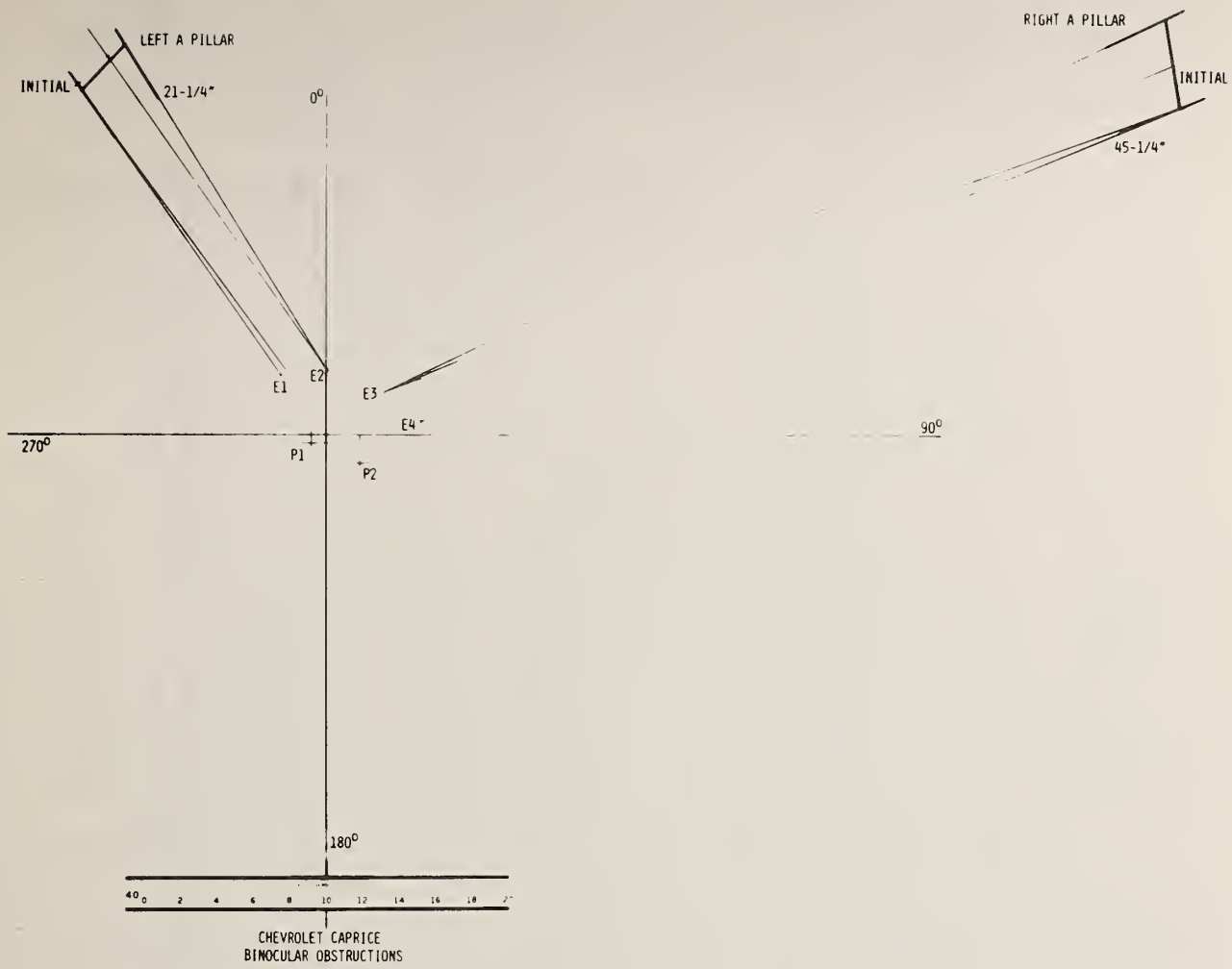
Zone: I

Obstruction	Left A Pillar		
Initial Slight to Outboard E - Rear Side	323°45'		
Adjusted Sight to Outboard E - Rear Side	330°		
Inboard E - Front Side	333°13'		
Angle to Bench Mark			
Obstruction Angle	3°13'		
Azimuth			

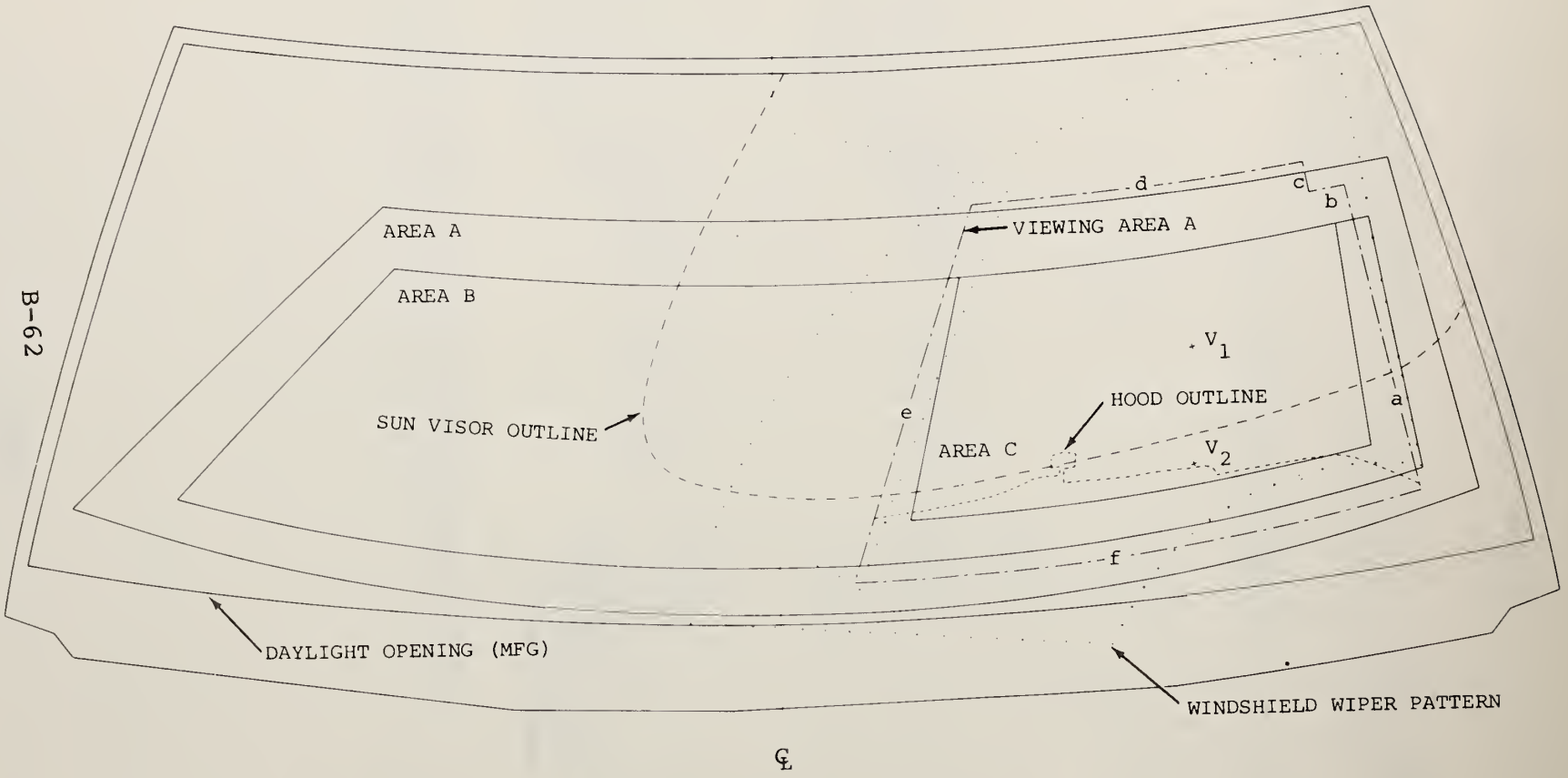
Zone: II

Obstruction	Right A Pillar		
Initial Sight to Outboard E - Rear Side	69°32'		
Adjusted Sight to Outboard E - Rear Side	30°00'		
Inboard E - Front Side	27°09'		
Angle to Bench Mark			
Obstruction Angle	2°51'		
Azimuth			

Explanations Pertinent to the Specific Measurements:



Plan View of Binocular Obstructions - Chevrolet Caprice.



Windshield Overlay Showing Relationship Between Critical Areas per FMVSS 104 and View Area A as Measured for This Vehicle - Chevrolet Caprice.

DATA SHEET 3

WINDSHIELD AREAS

VEHICLE:

MANUFACTURER General Motors YEAR 1978

MODEL Chevrolet Caprice BODY STYLE 4 Door

VIN 1N69U8S128642

VIEW AREA DIMENSIONAL MEASUREMENTS

Relative to Windshield Points

"A" Pillar to Side a 4.09

"A" Pillar to Side c 4.58

DLO Top of Windshield to Side d 5.72

DLO Bottom of Windshield to Side f 2.02

Relative to Critical A, B, C Areas

	A	B	C
Side a Leftward to	2.39	0.31	-1.59
Side c Leftward to	3.54	2.26	0.97
Side e Rightward to	24.96	23.56	-0.45
Side d Upward to	-0.38	-3.01	-3.01
Side f Downward to	+1.14	-0.78	-2.52

Critical Areas (A, B, C) Relative to Windshield Points

	A	B	C
"A" Pillar to	1.70	4.08	5.63
DLO Top of Windshield to	6.10	8.73	8.73
DLO Bottom of Windshield to	0.88	2.80	4.54

Right Front Three-Quarter View - 1978 Chevrolet Caprice 4-Door Sedan.

Right Rear Three-Quarter View - 1978 Chevrolet Caprice 4-Door Sedan.

APPENDIX B5 - CHEVROLET CHEVETTE

DATA SHEET NO. 1 - VEHICLE DATA

VEHICLE:

MANUFACTURER General Motors YEAR 1978

MODEL Chevrolet Chevette BODY STYLE 4 Door

VIN 1B68J8205230 ODOMETER 24

BUILD DATE 1/78

SPECIAL OPTIONS

FRONT SEAT TYPE: SPECIFIED Bucket

TILT STEERING WHEEL? YES ____ NO X

FRONT SEAT TRAVEL RANGE: SPECIFIED 5.0 in.

FRONT SEAT BACK ANGLE: SPECIFIED 26.5°

MEASURING POINT CORRECTIONS

	X (in.)	Z (in.)
P From Table 2	-0.88	NA
P From Table 3	+0.68	-0.21
Total P	-0.20	-0.21
V From Table 3	+0.68	-0.21

MANUFACTURER'S REFERENCE POINTS FOR SRP

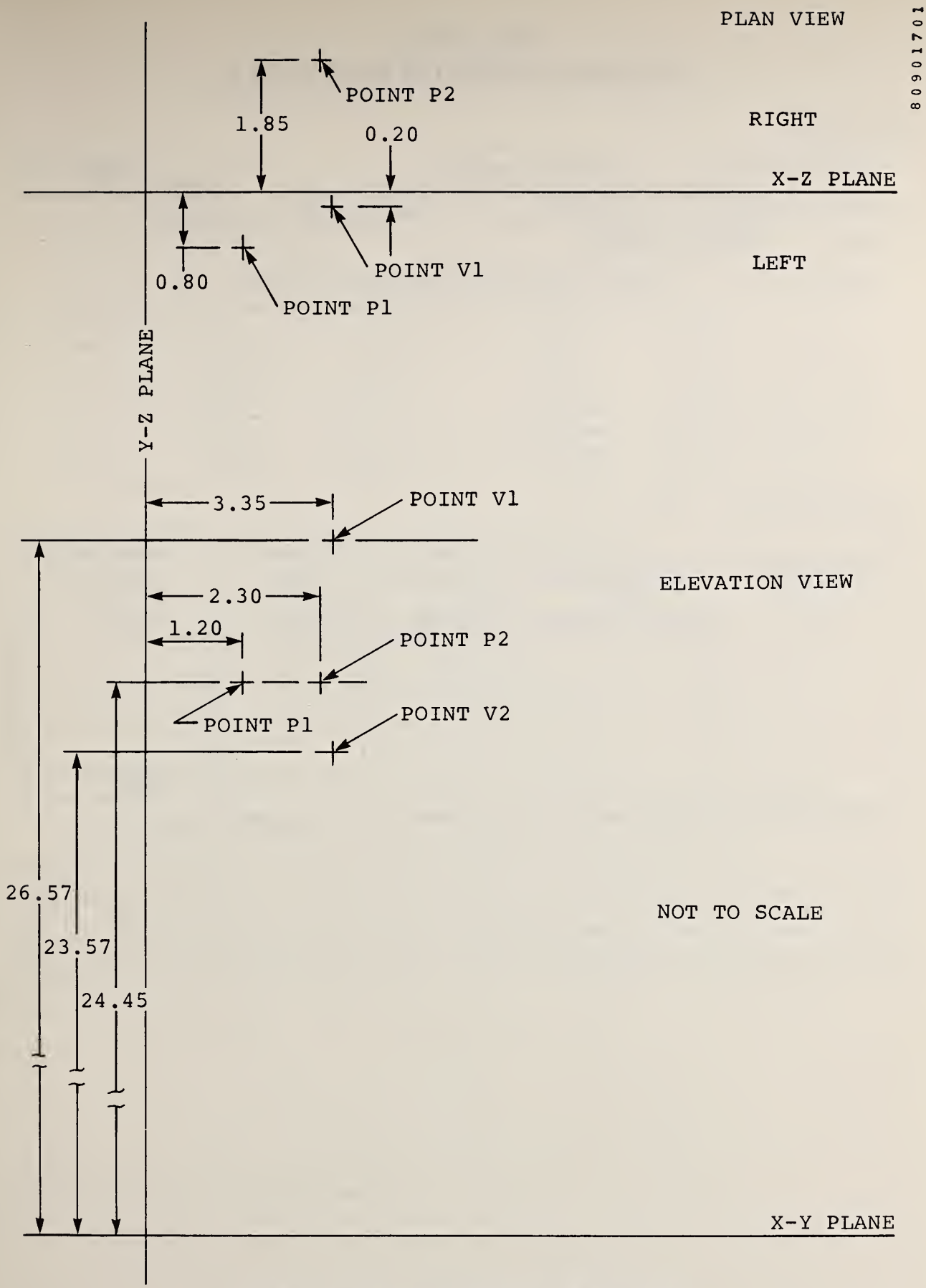
For X 14.50 (368) from Front Seat Forward Anchor Hole

For Y 13.15 in. to Zero Y Plane W20

For Z 8.23 (209) from Front Seat Forward Anchor Hole

MANUFACTURER'S DIMENSIONS FOR VEHICLE ATTITUDE AND SRP LOCATION

	From Axle Centerline	From Vehicle Centerline	Height Above Ground at Curb Weight
Front Station	36.02 in. (Front Axle)	--	9.02 in.
Rear Station	18.86 in. (Rear Axle)	--	8.86 in.
SRP	--	13.15 in.	18.75 in.
"R" Point	--	13.15 in.	18.75 in.



Relationship of Reference Points -
1978 Chevrolet Chevette 4-Door Hatchback Sedan.

DATA SHEET 2

MONOCULAR OBSTRUCTION ANGLE FROM V_1

VEHICLE:

MANUFACTURER General Motors YEAR 1978

MODEL Chevrolet Chevette BODY STYLE 4 Door

VIN 1B68J8Y205230

LOCATION OF "V" POINT RELATIVE TO THE "R" Point

	V_1	V_2
X	3.35	3.35
Y	-0.20	-0.20
Z	26.57	23.57

OBSTRUCTIONS: Zone I

Elevation	Obstruction	Left Angle	Right Angle	Obstruction Angle
V_1	Left A Pillar	328°53'	337°41'	8°48'

Total 8°48'

Explanations Pertinent to the Specific Measurements:

DATA SHEET 2

MONOCULAR OBSTRUCTION ANGLE FROM V_1

VEHICLE:

MANUFACTURER General Motors YEAR 1978

MODEL Chevrolet Chevette BODY STYLE 4 Door

VIN 1B68J8Y205230

LOCATION OF "V" POINT RELATIVE TO THE "R" Point

	V_1	V_2
X	3.35	3.35
Y	-0.20	-0.20
Z	26.57	23.57

OBSTRUCTIONS: Zone II

Elevation	Obstruction	Left Angle	Right Angle	Obstruction Angle
V_1	Right A Pillar	59°29'	65°04'	5°35'

Total 5°35'

Explanations Pertinent to the Specific Measurements:

DATA SHEET 2

MONOCULAR OBSTRUCTION ANGLE FROM V_1

VEHICLE:

MANUFACTURER General Motors YEAR 1978

MODEL Chevrolet Chevette BODY STYLE 4 Door

VIN 1B68J8Y205230

LOCATION OF "V" POINT RELATIVE TO THE "R" Point

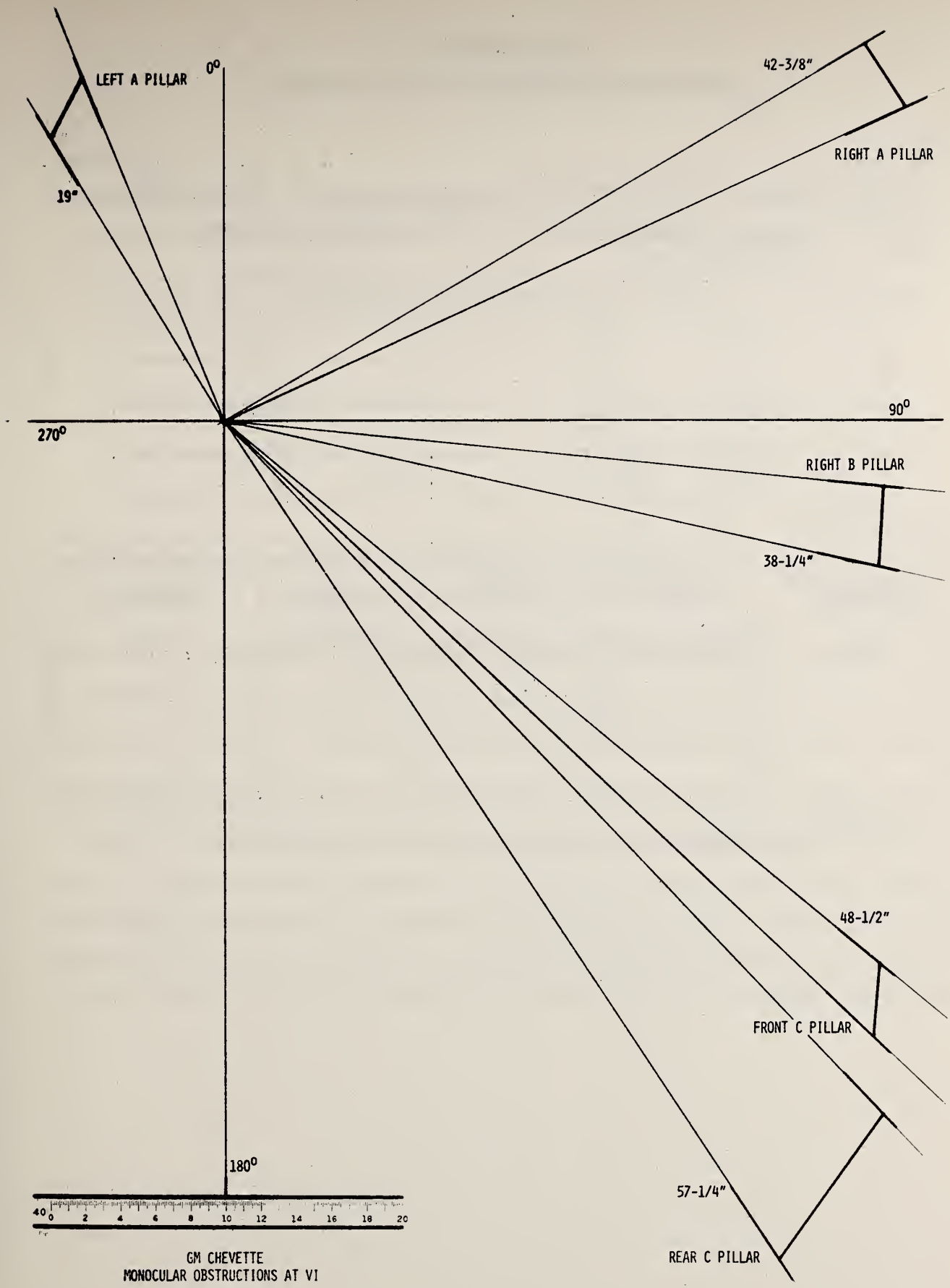
	V_1	V_2
X	3.35	3.35
Y	-0.20	-0.20
Z	26.57	23.57

OBSTRUCTIONS: Zone IV

Elevation	Obstruction	Left Angle	Right Angle	Obstruction Angle
V_1	Right B Pillar	95°52'	102°43'	6°51'
	Forward C Pillar	129°46'	133°40'	3°54'
	Rear C Pillar	136°42'	146°45'	10°03'

Total 20°48'

Explanations Pertinent to the Specific Measurements:



Plan View of Monocular Obstructions at V_1 - Chevrolet Chevette.

DATA SHEET 2

MONOCULAR OBSTRUCTION ANGLE FROM V_2

VEHICLE:

MANUFACTURER General Motors YEAR 1978

MODEL Chevrolet Chevette BODY STYLE 4 Door

VIN 1B68J8Y205230

LOCATION OF "V" POINT RELATIVE TO THE "R" Point

	V_1	V_2
X	3.35	3.35
Y	-0.20	-0.20
Z	26.57	23.57

OBSTRUCTIONS: Zone I

Elevation	Obstruction	Left Angle	Right Angle	Obstruction Angle
V_2	Left A Pillar	330°49'	338°29'	7°40'

Total 7°40'

Explanations Pertinent to the Specific Measurements:

DATA SHEET 2

MONOCULAR OBSTRUCTION ANGLE FROM V_2

VEHICLE:

MANUFACTURER General Motors YEAR 1978

MODEL Chevrolet Chevette BODY STYLE 4 Door

VIN 1B68J8Y205230

LOCATION OF "V" POINT RELATIVE TO THE "R" Point

	V_1	V_2
X	3.35	3.35
Y	-0.20	-0.20
Z	26.57	23.57

OBSTRUCTIONS: Zone II

Elevation	Obstruction	Left Angle	Right Angle	Obstruction Angle
V_2	Right A Pillar	56°09'	61°39'	5°30'

Total 5°30'

Explanations Pertinent to the Specific Measurements:

DATA SHEET 2

MONOCULAR OBSTRUCTION ANGLE FROM V_2

VEHICLE:

MANUFACTURER General Motors YEAR 1978

MODEL Chevrolet Chevette BODY STYLE 4 Door

VIN 1B68J8Y205230

LOCATION OF "V" POINT RELATIVE TO THE "R" Point

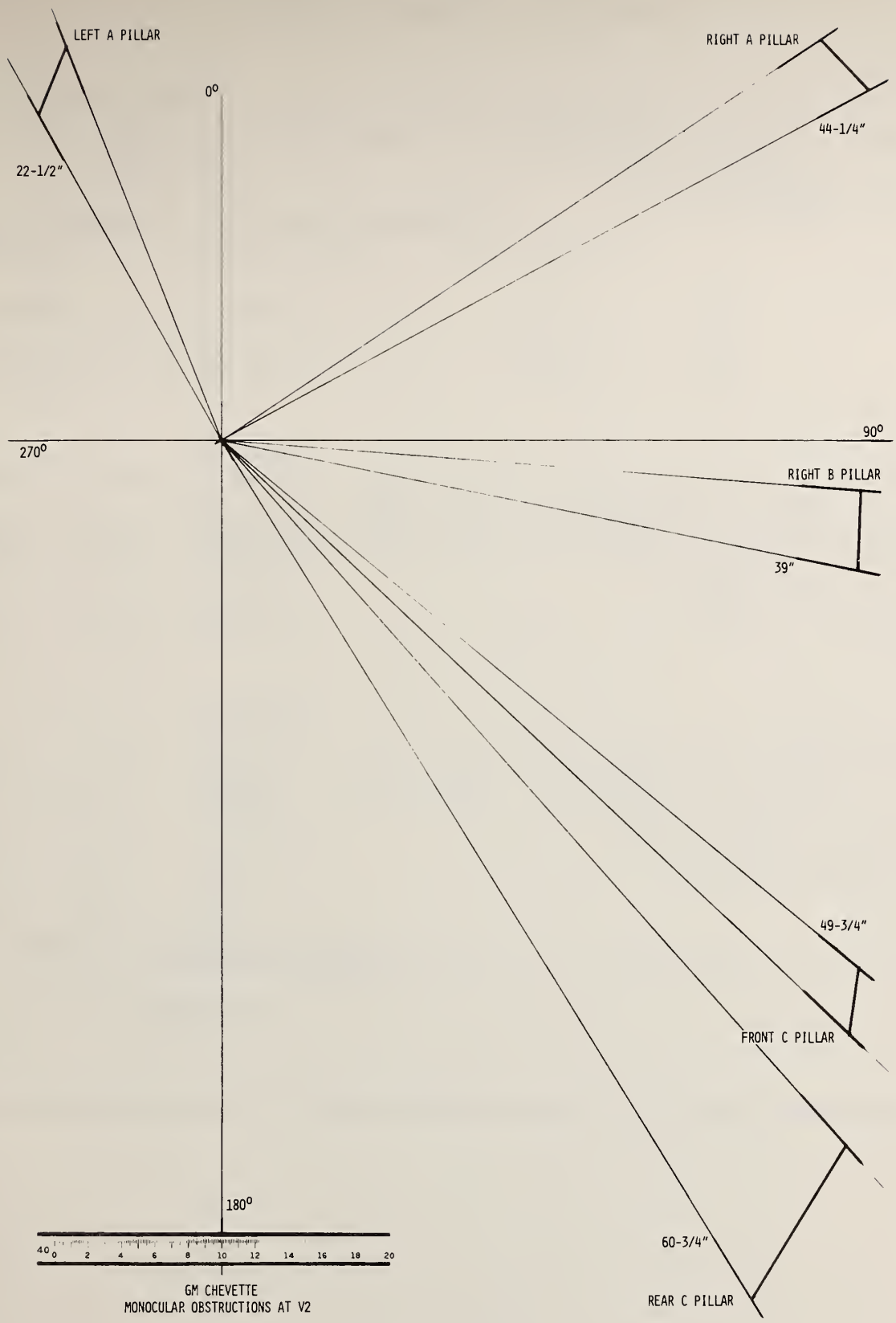
	V_1	V_2
X	3.35	3.35
Y	-0.20	-0.20
Z	26.57	23.57

OBSTRUCTIONS: Zone IV

Elevation	Obstruction	Left Angle	Right Angle	Obstruction Angle
V_2	Right B Pillar	94°43'	101°43'	7°00'
	Forward C Pillar	129°43'	133°27'	3°44'
	Rear C Pillar	138°37'	148°20'	9°43'

Total 20°27'

Explanations Pertinent to the Specific Measurements:



Plan View of Monocular Obstructions at V_2 - Chevrolet Chevette.

DATA SHEET 4

BINOCULAR OBSTRUCTION ANGLES

VEHICLE:

MANUFACTURER General Motors YEAR 1978

MODEL Chevrolet Chevette BODY STYLE 4 Door

VIN 1B68J8Y205230

	Dimensions Relative "R" Point		
	X	Y	Z
P_1	1.20	0.80	24.45
P_2	2.30	1.85	24.45

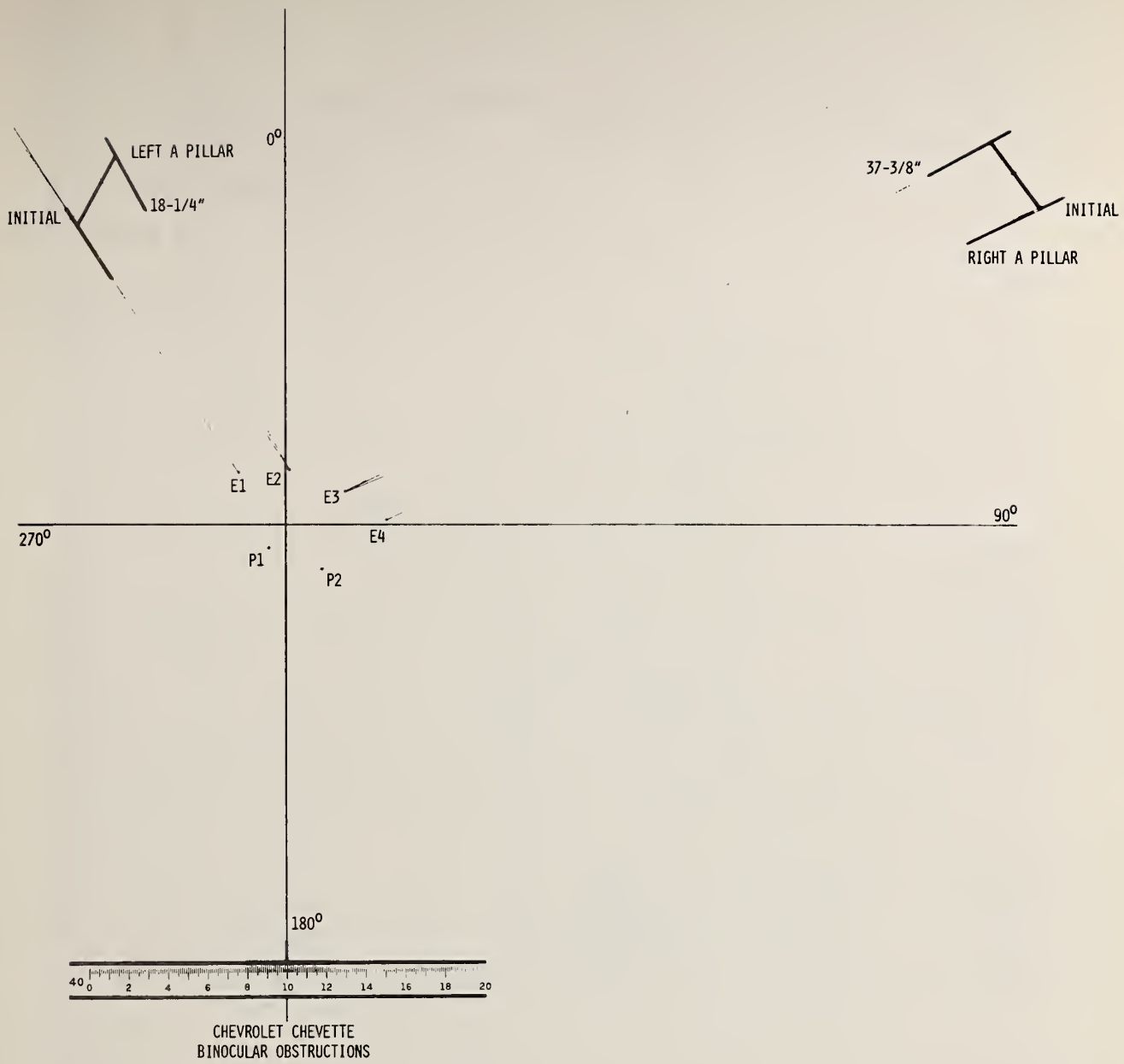
Zone: I

Obstruction	Left A Pillar		
Initial Sight to Outboard E - Rear Side	325°47'		
Adjusted Sight to Outboard E - Rear Side	330°00'		
Inboard E - Front Side	334°06'		
Angle to Bench Mark			
Obstruction Angle	4°06'		
Azimuth			

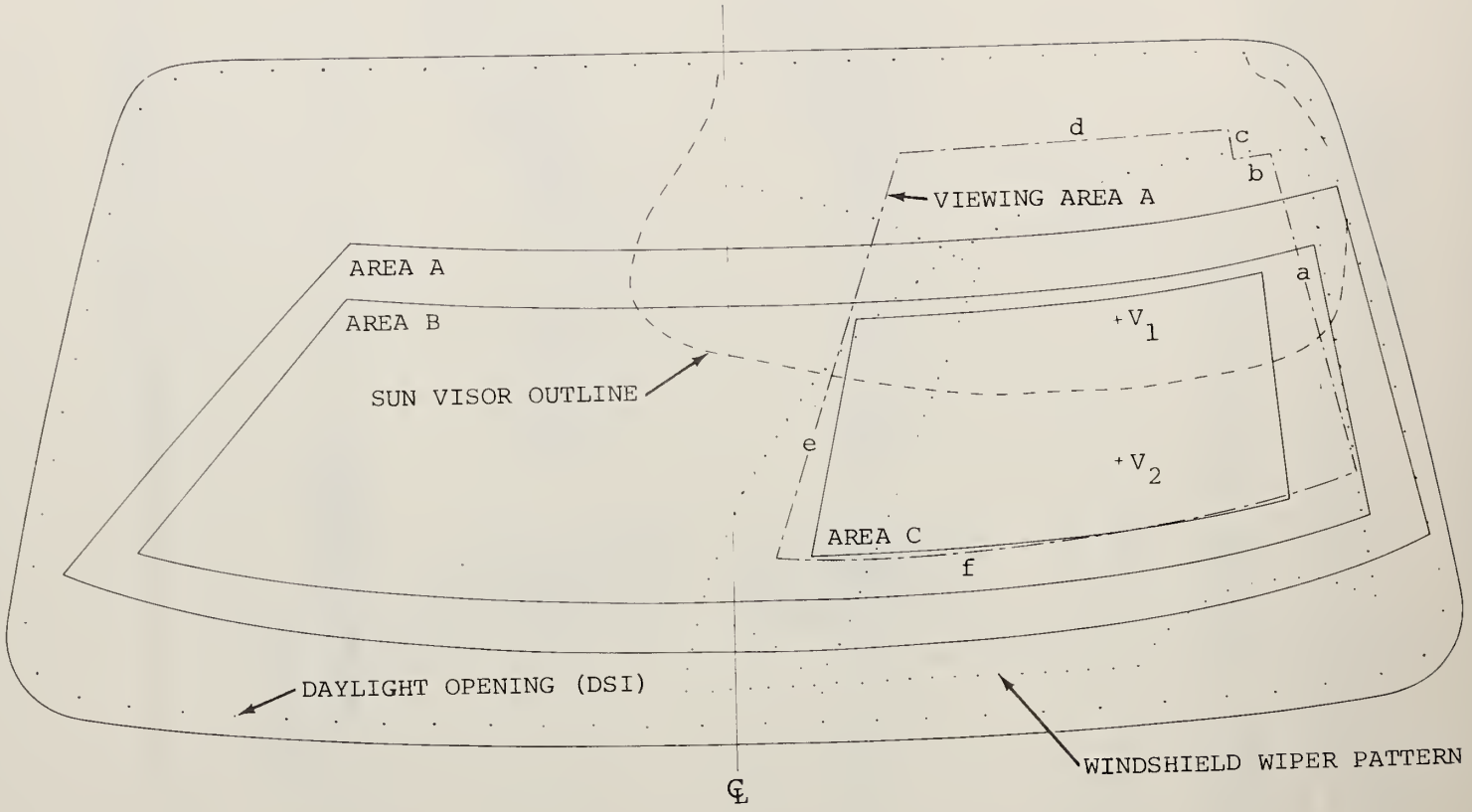
Zone: II

Obstruction	Right A Pillar		
Initial Sight to Outboard E - Rear Side	66°48'		
Adjusted Sight to Outboard E - Rear Side	30°00'		
Inboard E - Front Side	26°57'		
Angle to Bench Mark			
Obstruction Angle	3°03'		
Azimuth			

Explanations Pertinent to the Specific Measurements:



Plan View of Binocular Obstructions - Chevrolet Chevette.



Windshield Overlay Showing Relationship Between Critical Areas per FMVSS 104 and View Area A as Measured for This Vehicle - Chevrolet Chevette.

DATA SHEET 3

WINDSHIELD AREAS

VEHICLE:

MANUFACTURER General Motors YEAR 1978

MODEL Chevrolet Chevette BODY STYLE 4 Door

VIN 1B68J8Y205230

VIEW AREA DIMENSIONAL MEASUREMENTS

Relative to Windshield Points

"A" Pillar to Side a 2.71

"A" Pillar to Side c 3.91

DLO Top of Windshield to Side d 3.44

DLO Bottom of Windshield to Side f 6.73

Relative to Critical A, B, C Areas

	A	B	C
Side a Leftward to	1.93	.16	-2.51
Side c Leftward to	3.44	2.27	.27
Side e Rightward to	18.34	17.84	-.25
Side d Upward to	-3.22	-5.19	-5.72
Side f Downward to	3.17	1.46	-.07

Critical Areas (A, B, C) Relative to Windshield Points

	A	B	C
"A" Pillar to	.69	2.57	5.20
DLO Top of Windshield to	6.66	8.63	9.16
DLO Bottom of Windshield to	3.56	5.27	6.80

Left Front Three-Quarter View - 1978 Chevrolet Chevette 4-Door Hatchback Sedan.

Right Rear Three-Quarter View - 1978 Chevrolet Chevette 4-Door Hatchback Sedan.

APPENDIX B6 - CHEVROLET CORVETTE

DATA SHEET NO. 1 - VEHICLE DATA

VEHICLE:

MANUFACTURER General Motors YEAR 1978

MODEL Corvette BODY STYLE 2 Door Coupe

VIN 1Z87L8S410882 ODOMETER 1740

BUILD DATE 11/77

SPECIAL OPTIONS

FRONT SEAT TYPE: SPECIFIED Bucket

TILT STEERING WHEEL? YES X NO

FRONT SEAT TRAVEL RANGE: SPECIFIED 5.5 in.

FRONT SEAT BACK ANGLE: SPECIFIED 33°

MEASURING POINT CORRECTIONS

	X (in.)	Z (in.)
P From Table 2	-1.26	--
P From Table 3	2.65	-0.96
Total P	+1.39	-0.96
V From Table 3	+2.65	-0.96

MANUFACTURER'S REFERENCE POINTS FOR SRP

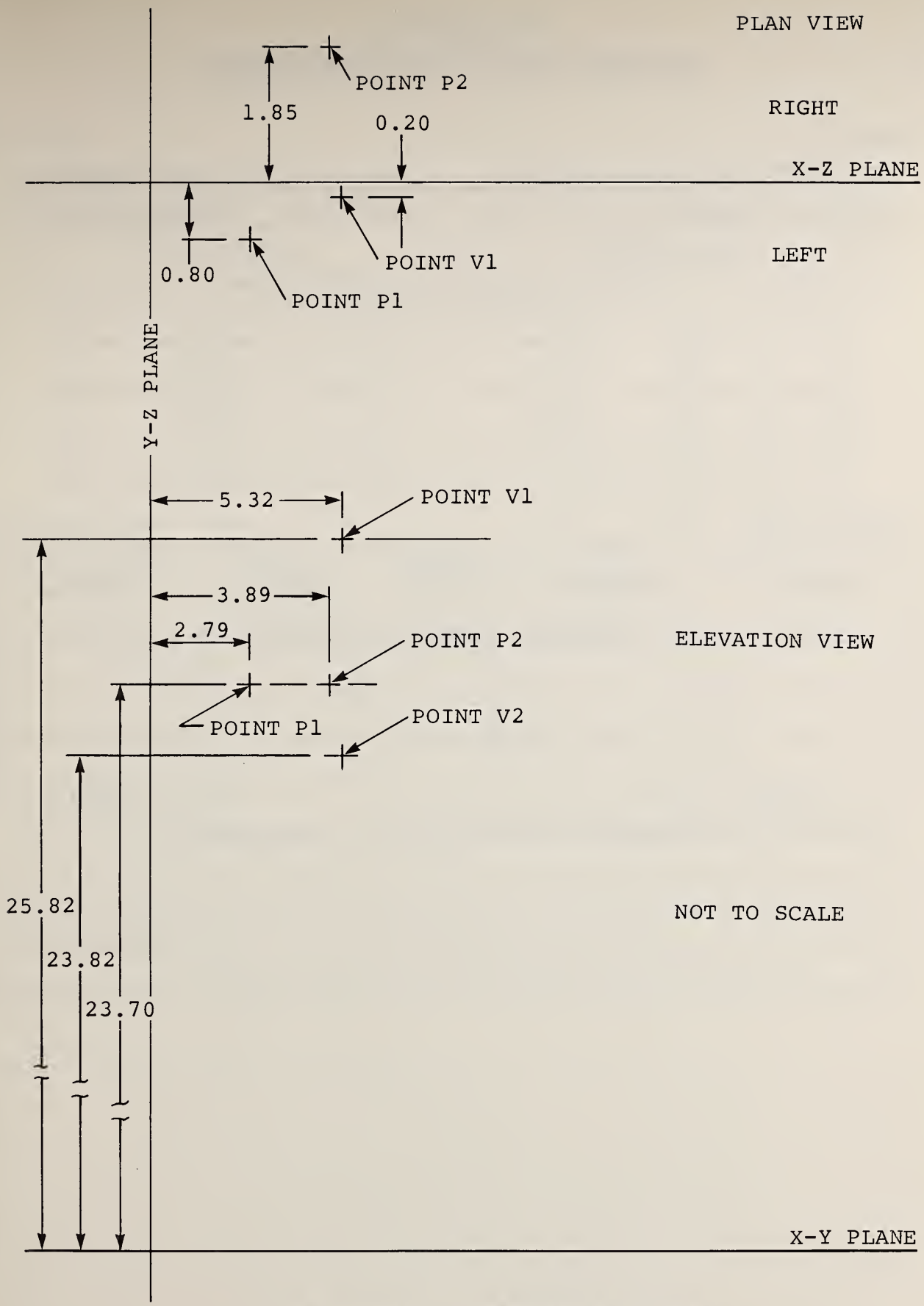
For X 13.77 in. from Front Seat Forward Anchor Hole

For Y 13.25 in. to Zero Y Plane W20

For Z 4.25 in. from Front Seat Forward Anchor Hole

MANUFACTURER'S DIMENSIONS FOR VEHICLE ATTITUDE AND SRP LOCATION

	From Axle Centerline	From Vehicle Centerline	Height Above Ground Curb Weight
Front Station	30.5 in. (Front Axle)	NA	8.68 in.
Rear Station	24.0 in. (Rear Axle)	NA	8.57 in.
SRP	NA	13.25 in.	15.13 in.
"R" Point	NA	13.25 in.	15.13 in.



Relationship of Reference Points -
1978 Chevrolet Corvetts 2-Door Coupe.

DATA SHEET 2

MONOCULAR OBSTRUCTION ANGLE FROM V_1

VEHICLE:

MANUFACTURER General Motors YEAR 1978

MODEL Corvette BODY STYLE 2 Door Coupe

VIN 1Z87L8S410882

LOCATION OF "V" POINT RELATIVE TO THE "R" Point

	V_1	V_2
X	5.32	5.32
Y	0.20	0.20
Z	25.82	22.82

OBSTRUCTIONS: Zone I

Elevation	Obstruction	Left Angle	Right Angle	Obstruction Angle
V_1	Left A Pillar	336°25'	343°53'	7°28'

Total 7°28'

Explanations Pertinent to the Specific Measurements:

DATA SHEET 2

MONOCULAR OBSTRUCTION ANGLE FROM V_1

VEHICLE:

MANUFACTURER General Motors YEAR 1978

MODEL Corvette BODY STYLE 2 Door Coupe

VIN 1Z87L8S410882

LOCATION OF "V" POINT RELATIVE TO THE "R" Point

	V_1	V_2
X	5.32	5.32
Y	0.20	0.20
Z	25.82	22.82

OBSTRUCTIONS: Zone II

Elevation	Obstruction	Left Angle	Right Angle	Obstruction Angle
V_1	Right A Pillar	59°04'	63°32'	4°28'

Total 4°28'

Explanations Pertinent to the Specific Measurements:

DATA SHEET 2

MONOCULAR OBSTRUCTION ANGLE FROM V_1

VEHICLE:

MANUFACTURER General Motors YEAR 1978

MODEL Corvette BODY STYLE 2 Door Coupe

VIN 1Z87L8S410882

LOCATION OF "V" POINT RELATIVE TO THE "R" Point

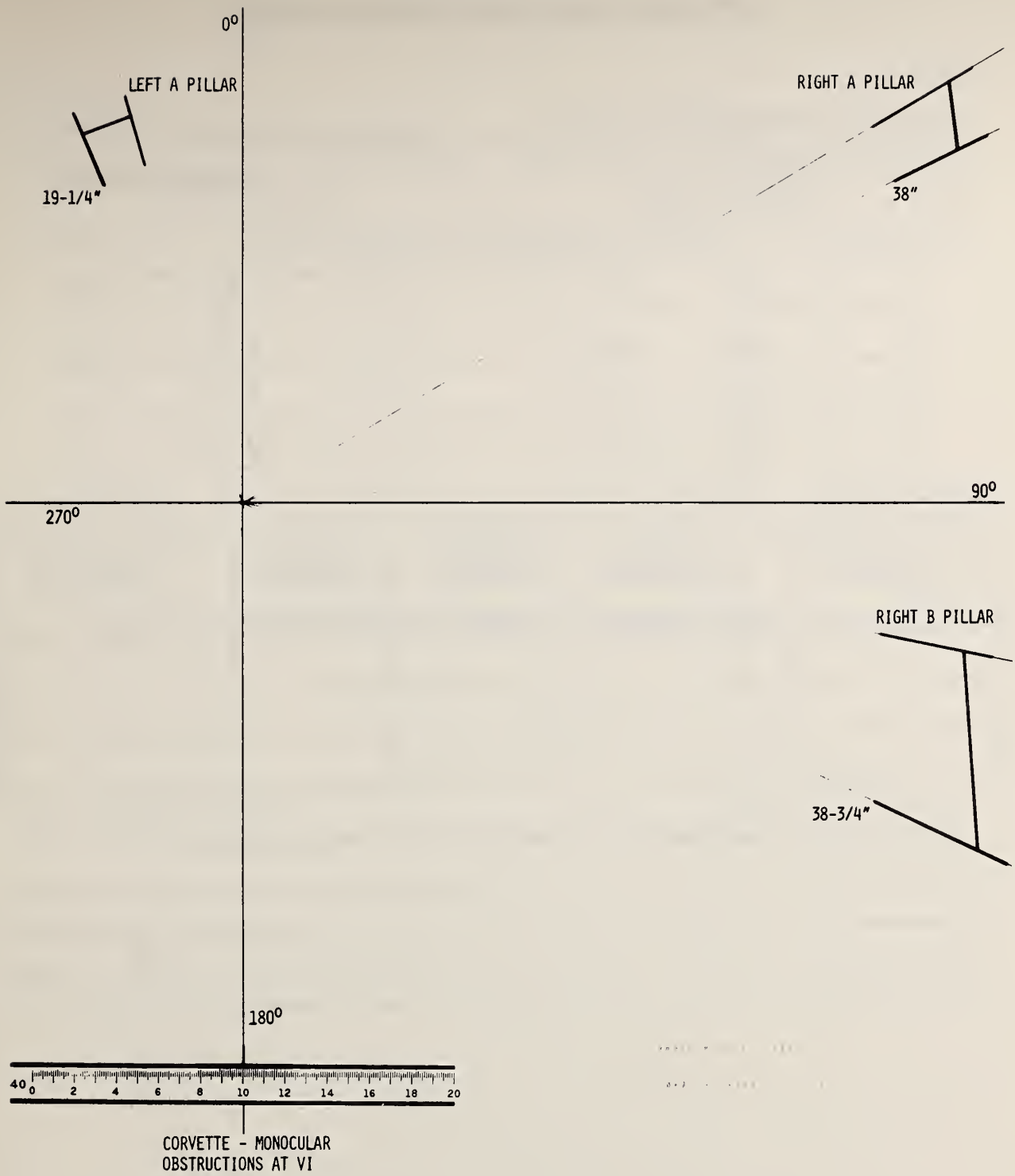
	V_1	V_2
X	5.32	5.32
Y	0.20	0.20
Z	25.82	22.82

OBSTRUCTIONS: Zone IV

Elevation	Obstruction	Left Angle	Right Angle	Obstruction Angle
V_1	Right B Pillar	101°28'	115°21'	13°53'

Total 13°53'

Explanations Pertinent to the Specific Measurements:



Plan View of Monocular Obstructions at V_1 - Chevrolet Corvette.

DATA SHEET 2

MONOCULAR OBSTRUCTION ANGLE FROM V_2

VEHICLE:

MANUFACTURER General Motors YEAR 1978

MODEL Corvette BODY STYLE 2 Door Coupe

VIN 1Z87L8S410882

LOCATION OF "V" POINT RELATIVE TO THE "R" Point

	V_1	V_2
X	5.32	5.32
Y	0.20	0.20
Z	25.82	22.82

OBSTRUCTIONS: Zone I

Elevation	Obstruction	Left Angle	Right Angle	Obstruction Angle
V_2	Left A Pillar	336°51'	342°59'	6°08'

Total 6°08'

Explanations Pertinent to the Specific Measurements:

DATA SHEET 2

MONOCULAR OBSTRUCTION ANGLE FROM V_2

VEHICLE:

MANUFACTURER General Motors YEAR 1978

MODEL Corvette BODY STYLE 2 Door Coupe

VIN 1Z87L8S410882

LOCATION OF "V" POINT RELATIVE TO THE "R" Point

	V_1	V_2
X	5.32	5.32
Y	0.20	0.20
Z	25.82	22.82

OBSTRUCTIONS: Zone II

Elevation	Obstruction	Left Angle	Right Angle	Obstruction Angle
V_2	Right A Pillar	55°52'	59°57'	4°05'

Total 4°05'

Explanations Pertinent to the Specific Measurements:

DATA SHEET 2

MONOCULAR OBSTRUCTION ANGLE FROM V_2

VEHICLE:

MANUFACTURER General Motors YEAR 1978

MODEL Corvette BODY STYLE 2 Door Coupe

VIN 1Z87L8S410882

LOCATION OF "V" POINT RELATIVE TO THE "R" Point

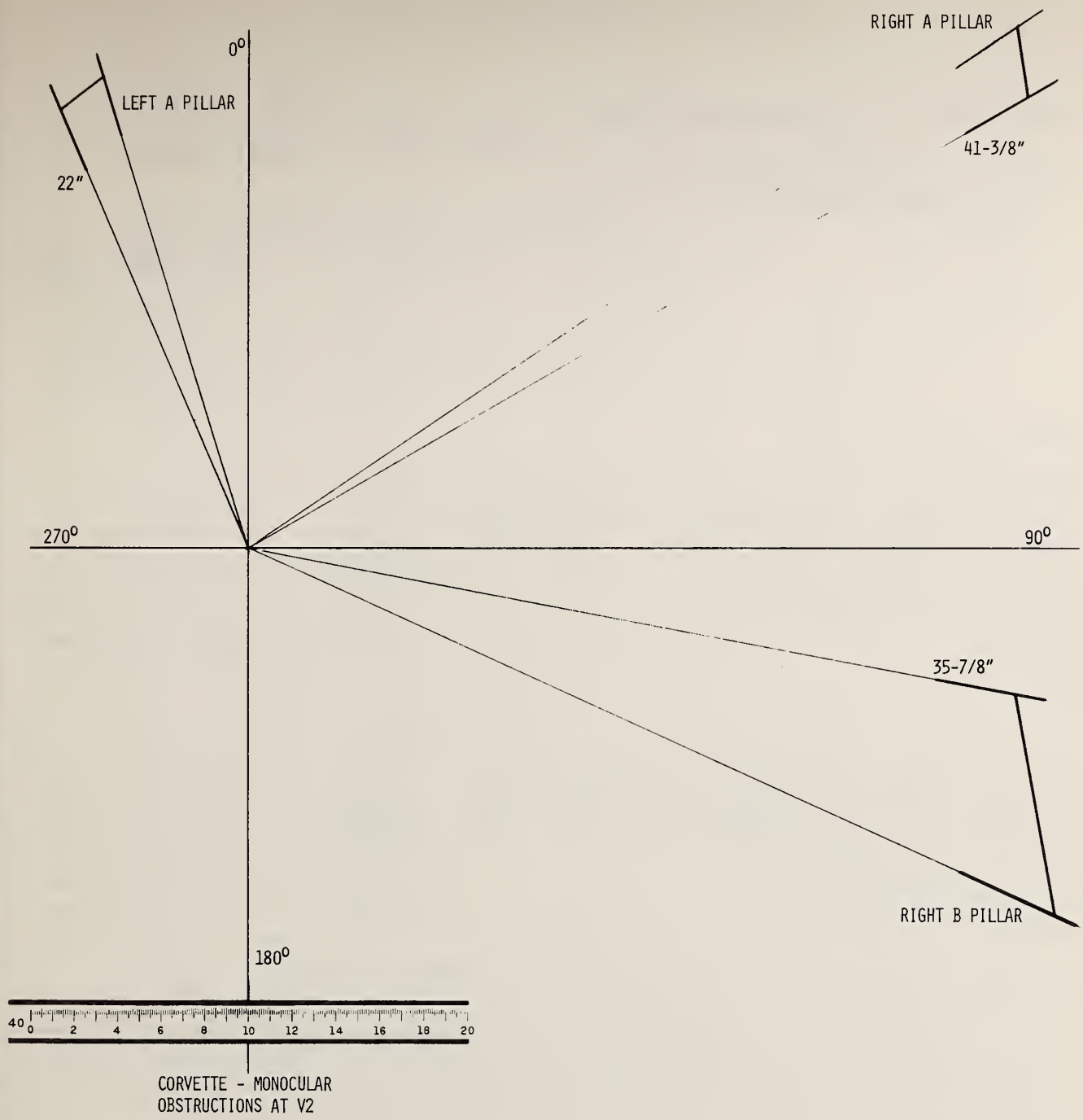
	V_1	V_2
X	5.32	5.32
Y	0.20	0.20
Z	25.82	22.82

OBSTRUCTIONS: Zone IV

Elevation	Obstruction	Left Angle	Right Angle	Obstruction Angle
V_2	Right B Pillar	100°48'	114°28'	13°40'

Total 13°40'

Explanations Pertinent to the Specific Measurements:



Plan View of Monocular Obstructions at V_2 - Chevrolet Corvette.

DATA SHEET 4

BINOCULAR OBSTRUCTION ANGLES

VEHICLE:

MANUFACTURER General Motors YEAR 1978

MODEL Corvette BODY STYLE 2 Door Coupe

VIN 1Z87L8S410882

	Dimensions Relative to "R" Point		
	X	Y	Z
P_1	2.79	-0.80	23.70
P_2	3.89	+1.85	23.70

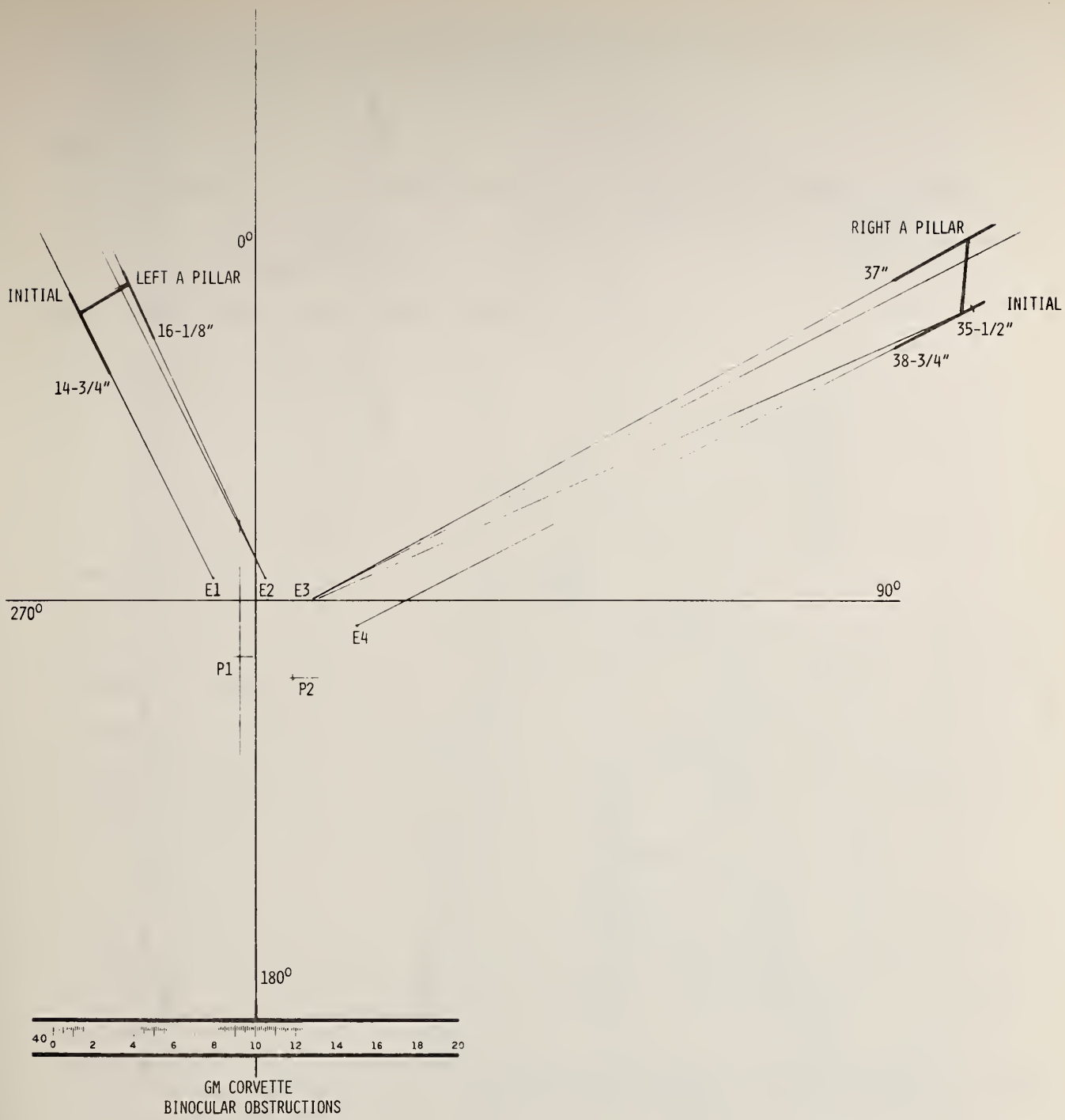
Zone: I

Obstruction	Left A Pillar		
Initial Sight to Outboard E - Rear Side	333°56'		
Adjusted Sight to Outboard E - Rear Side	333°56'		
Inboard E - Front Side	335°11'		
Angle to Bench Mark			
Obstruction Angle	1°15'		
Azimuth			

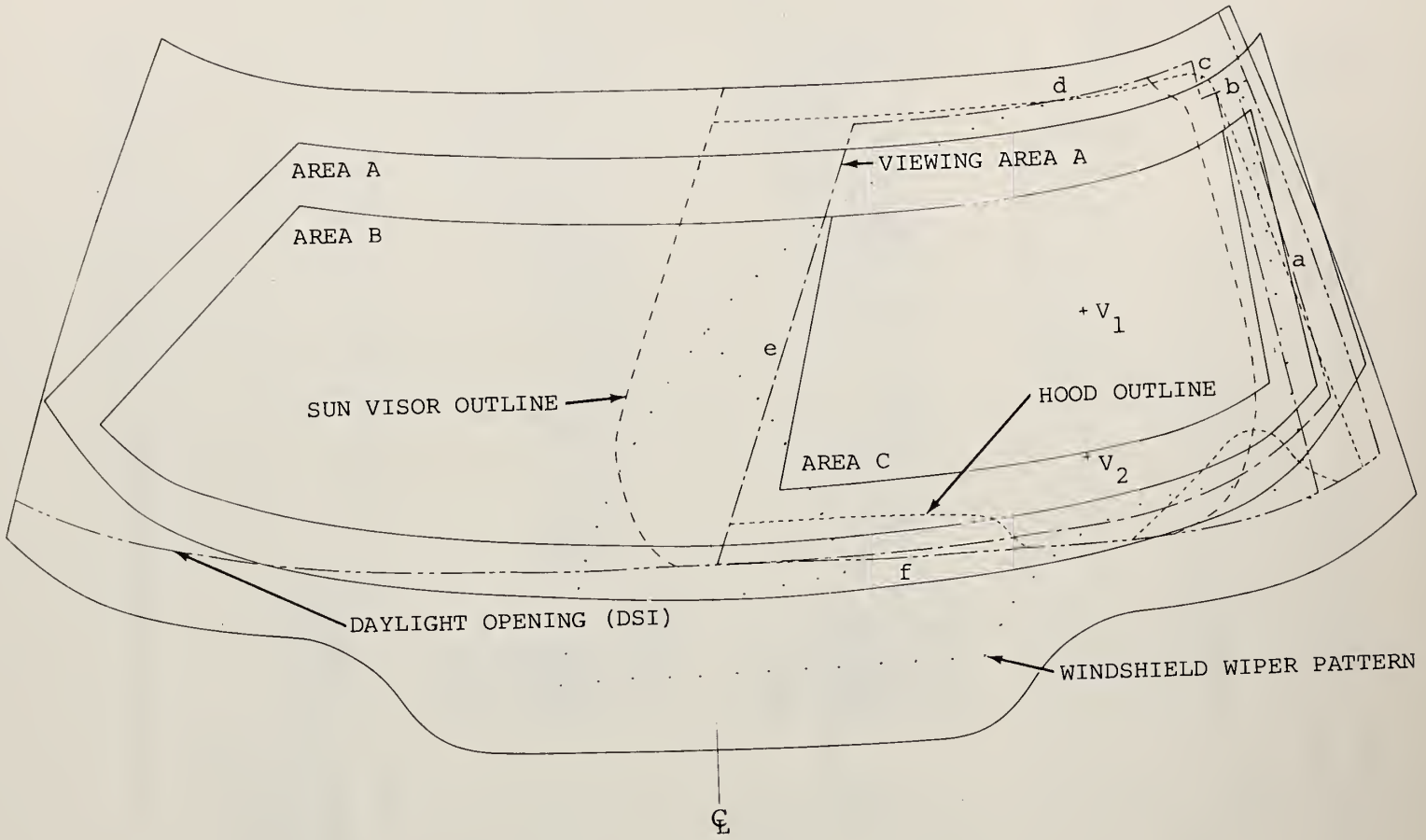
Zone: II

Obstruction	Right A Pillar		
Initial Sight to Outboard E - Rear Side	65°56'		
Adjusted Sight to Outboard E - Rear Side	30°00'		
Inboard E - Front Side	28°32'		
Angle to Bench Mark			
Obstruction Angle	1°28'		
Azimuth			

Explanations Pertinent to the Specific Measurements:



Plan View of Binocular Obstructions - Chevrolet Corvette.



Windshield Overlay Showing Relationship Between Critical Areas per FMVSS 104 and View Area A as Measured for This Vehicle - Chevrolet Corvette.

DATA SHEET 3

WINDSHIELD AREAS

VEHICLE:

MANUFACTURER General Motors YEAR 1978

MODEL Corvette BODY STYLE 2 Door Coupe

VIN 1Z87L8S410882

VIEW AREA DIMENSIONAL MEASUREMENTS

Relative to Windshield Points

"A" Pillar to Side a* 3.62

"A" Pillar to Side c 2.13

DLO Top of Windshield to Side d 1.32

DLO Bottom of Windshield to Side f* .52

Relative to Critical A, B, C Areas

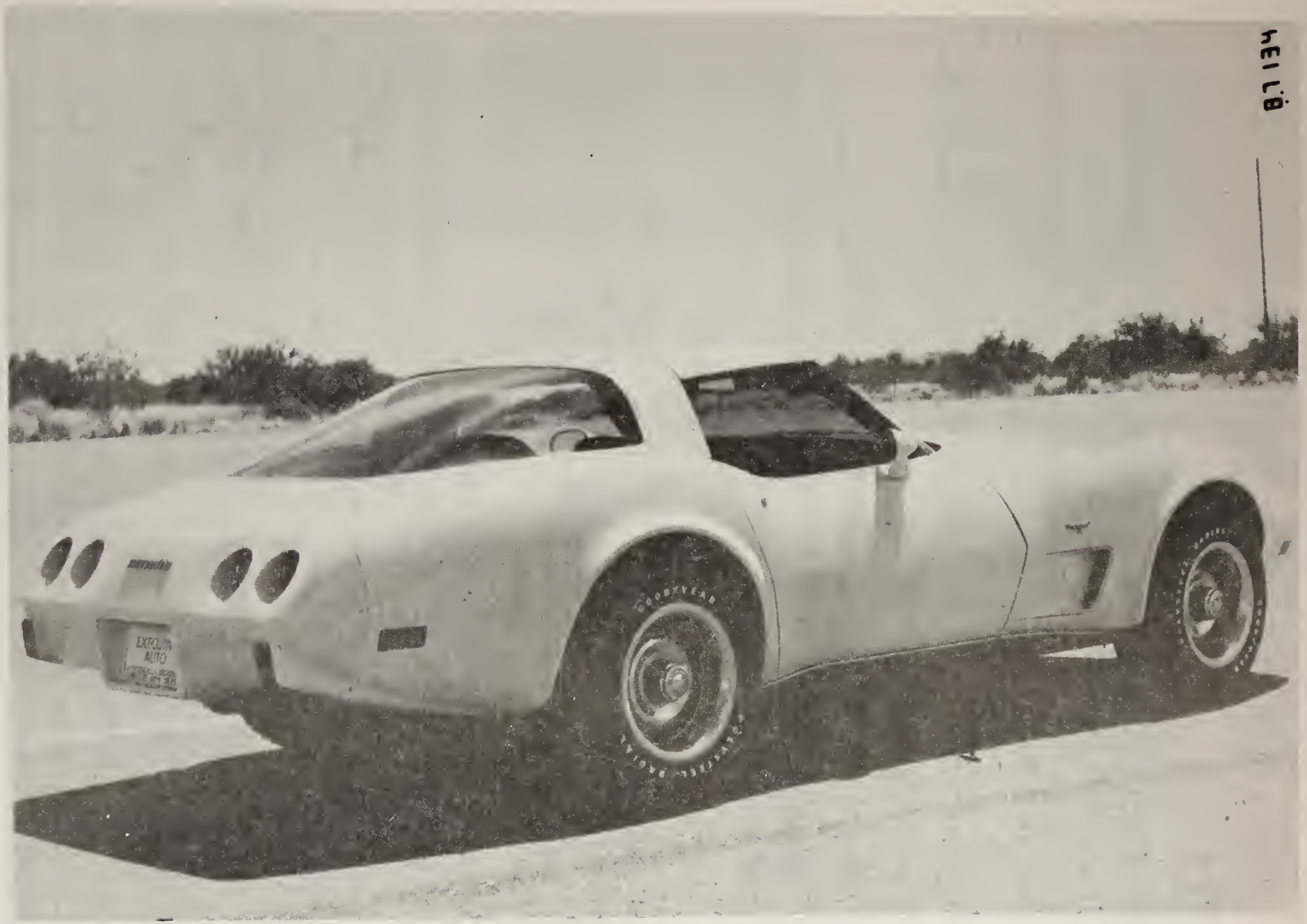
	A	B	C
*Side a Leftward to	3.62	1.13	-.78
Side c Leftward to	2.79	1.75	.53
Side e Rightward to	20.53	19.69	-.25
Side d Upward to	-.94	-3.35	-3.35
*Side f Downward to	1.17	-.80	-2.70

Critical Areas (A, B, C) Relative to Windshield Points

	A	B	C
"A" Pillar to	.34	2.58	3.98
DLO Top of Windshield to	2.27	4.68	4.68
DLO Bottom of Windshield to	.65	1.33	3.23

*NOTE: For Side a and Side f the windshield was not visible at the angles given (17°CCW and 3° down respectively). The angles were corrected to 14°37'CCW (Side a) and 2°13' (Side f).

Left Front Three-Quarter View - 1978 Chevrolet Corvette 2-Door Coupe.



Right Rear Three-Quarter View - 1978 Chevrolet Corvette 2-Door Coupe.

APPENDIX B7 - CHEVROLET MALIBU

DATA SHEET NO. 1 - VEHICLE DATA

VEHICLE:

MANUFACTURER General Motors YEAR 1978

MODEL Chevrolet Malibu BODY STYLE Station Wagon

VIN 1W35U8K541999 ODOMETER 2908

BUILD DATE 4/78

SPECIAL OPTIONS

FRONT SEAT TYPE: SPECIFIED Bench

TILT STEERING WHEEL? YES X NO

FRONT SEAT TRAVEL RANGE: SPECIFIED 7.16 in.

FRONT SEAT BACK ANGLE: SPECIFIED 26°

MEASURING POINT CORRECTIONS

	X (in.)	Z (in.)
P From Table 2	-1.89	--
P From Table 3	+0.34	-.10
Total P	-1.55	-.10
V From Table 3	+0.34	-.10

MANUFACTURER'S REFERENCE POINTS FOR SRP

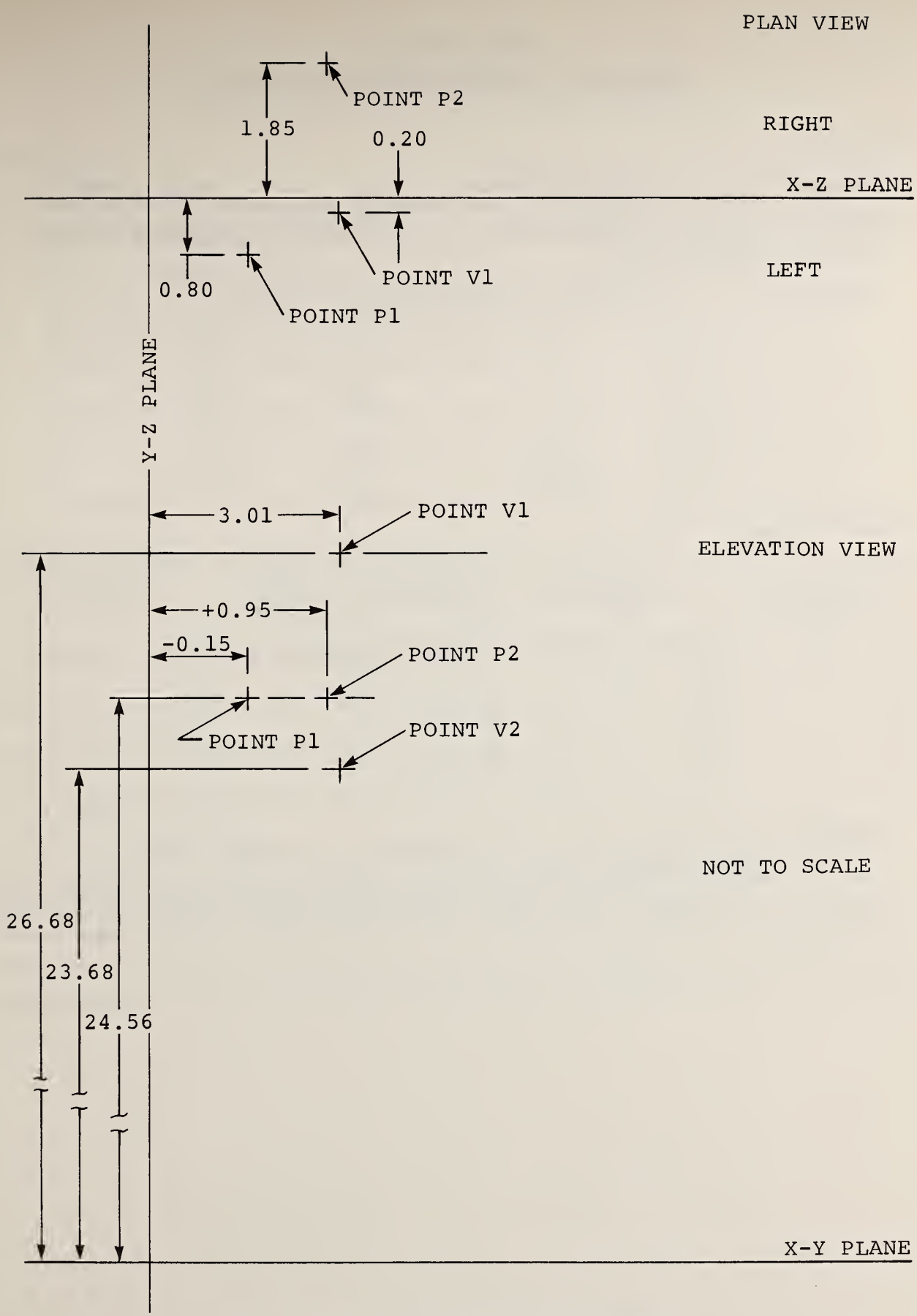
For X 13.70 in. from Front Seat Forward Anchor Hole

For Y 14.49 in. to Zero Y Plane

For Z 7.83 in. from Front Seat Forward Anchor Hole

MANUFACTURER'S DIMENSIONS FOR VEHICLE ATTITUDE AND SRP LOCATION

	From Axle Centerline	From Vehicle Centerline	Height Above Ground (Curb Weight)
Front Station	24.53 in. (Front Axle)	--	9.96 in.
Rear Station	20.94 in. (Rear Axle)	--	10.28 in.
SRP	--	14.49 in.	20.9 in.
"R" Point	--	16.01 in.	20.9 in.



Relationship of Reference Points -
1978 Chevrolet Malibu 4-Door Station Wagon.

DATA SHEET 2

MONOCULAR OBSTRUCTION ANGLE FROM V_1

VEHICLE:

MANUFACTURER General Motors YEAR 1978

MODEL Chevrolet Malibu BODY STYLE Station Wagon

VIN 1W35U8K541999

LOCATION OF "V" POINT RELATIVE TO THE "R" Point

	V_1	V_2
X	3.01	3.01
Y	-0.20	-0.20
Z	26.68	23.68

OBSTRUCTIONS: Zone I

Elevation	Obstruction	Left Angle	Right Angle	Obstruction Angle
V_1	Left A Pillar	330°21'	340°24'	10°3'

Total 10°3'

Explanations Pertinent to the Specific Measurements:

Local Plastic Window guide lying in the V_1 plane increased the obstruction angle. The rear view mirror was slightly above the V_1 plane.

DATA SHEET 2

MONOCULAR OBSTRUCTION ANGLE FROM V_1

VEHICLE:

MANUFACTURER General Motors YEAR 1978

MODEL Chevrolet Malibu BODY STYLE Station Wagon

VIN 1W35U8K541999

LOCATION OF "V" POINT RELATIVE TO THE "R" Point

	V_1	V_2
X	3.01	3.01
Y	-0.20	-0.20
Z	26.68	23.68

OBSTRUCTIONS: Zone II

Elevation	Obstruction	Left Angle	Right Angle	Obstruction Angle
V_1	Right A Pillar	60°45'	66°09'	5°24'

Total 5°24'

Explanations Pertinent to the Specific Measurements:

DATA SHEET 2

MONOCULAR OBSTRUCTION ANGLE FROM V_1

VEHICLE:

MANUFACTURER General Motors YEAR 1978

MODEL Chevrolet Malibu BODY STYLE Station Wagon

VIN 1W35U8K541999

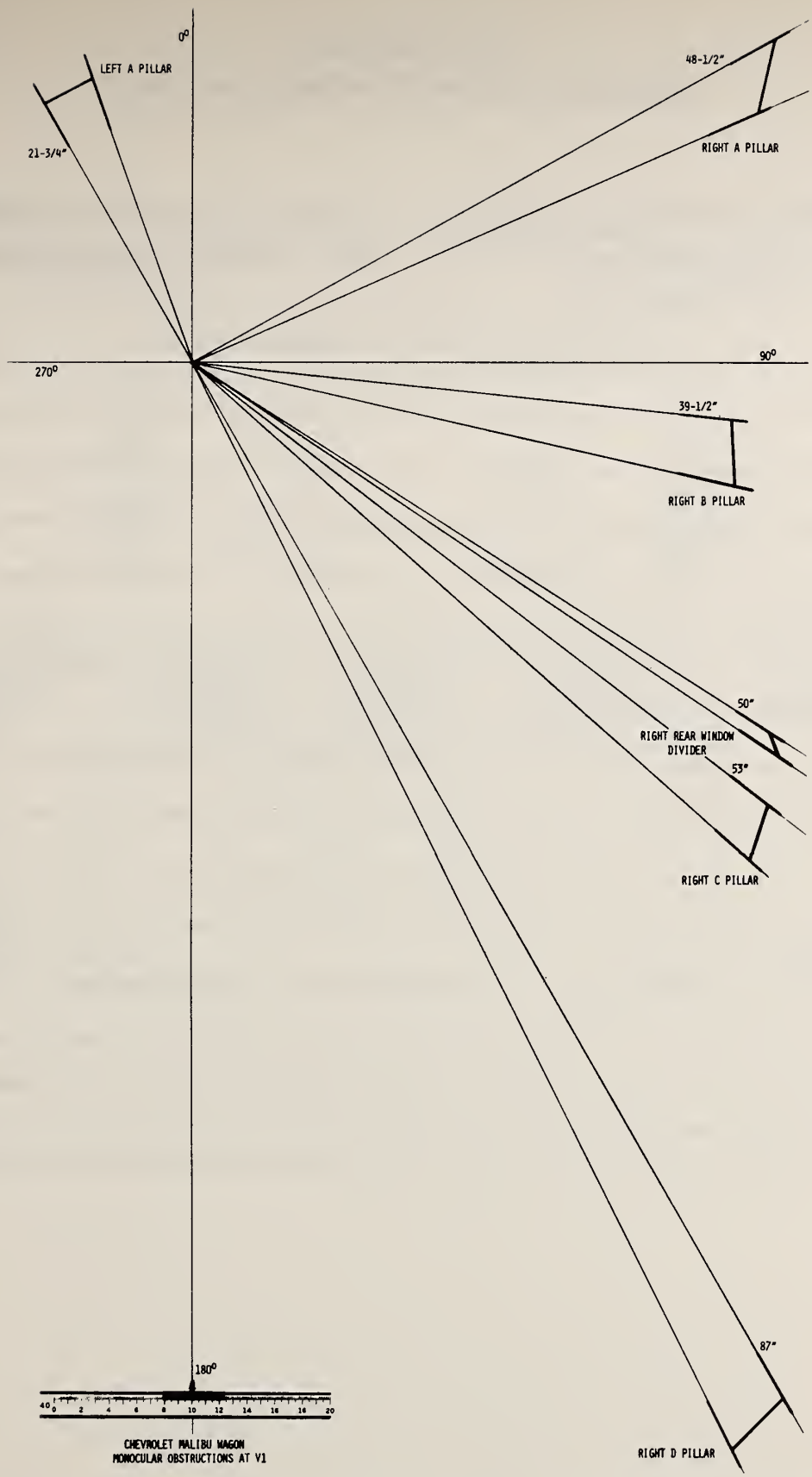
LOCATION OF "V" POINT RELATIVE TO THE "R" Point

	V_1	V_2
X	3.01	3.01
Y	-0.20	-0.20
Z	26.68	23.68

OBSTRUCTIONS: Zone IV

Elevation	Obstruction	Left Angle	Right Angle	Obstruction Angle
V_1	Right B Pillar	96°02'	102°50'	6°48'
	Rear Window Divider	122°39'	123°55'	1°16'
	Right C Pillar	127°32'	131°41'	4°09'
	Right D Pillar	150°13'	153°35'	3°22'
			Total	15°35'

Explanations Pertinent to the Specific Measurements:



Plan View of Monocular Obstructions at V_1 - Chevrolet Malibu Wagon.

DATA SHEET 2

MONOCULAR OBSTRUCTION ANGLE FROM V_2

VEHICLE:

MANUFACTURER General Motors YEAR 1978

MODEL Chevrolet Malibu BODY STYLE Station Wagon

VIN 1W35U8K541999

LOCATION OF "V" POINT RELATIVE TO THE "R" Point

	V_1	V_2
X	3.01	3.01
Y	-0.20	-0.20
Z	26.68	23.68

OBSTRUCTIONS: Zone I

Elevation	Obstruction	Left Angle	Right Angle	Obstruction Angle
V_2	Left A Pillar	331°22'	339°21'	7°59'

Total 7°59'

Explanations Pertinent to the Specific Measurements:

DATA SHEET 2

MONOCULAR OBSTRUCTION ANGLE FROM V_2

VEHICLE:

MANUFACTURER General Motors YEAR 1978

MODEL Chevrolet Malibu BODY STYLE Station Wagon

VIN 1W35U8K541999

LOCATION OF "V" POINT RELATIVE TO THE "R" Point

	V_1	V_2
X	3.01	3.01
Y	-0.20	-0.20
Z	26.68	23.68

OBSTRUCTIONS: Zone II

Elevation	Obstruction	Left Angle	Right Angle	Obstruction Angle
V_2	Right A Pillar	58°25'	63°16'	4°51'

Total 4°51'

Explanations Pertinent to the Specific Measurements:

DATA SHEET 2

MONOCULAR OBSTRUCTION ANGLE FROM V_2

VEHICLE:

MANUFACTURER General Motors YEAR 1978

MODEL Chevrolet Malibu BODY STYLE Station Wagon

VIN 1W35U8K541999

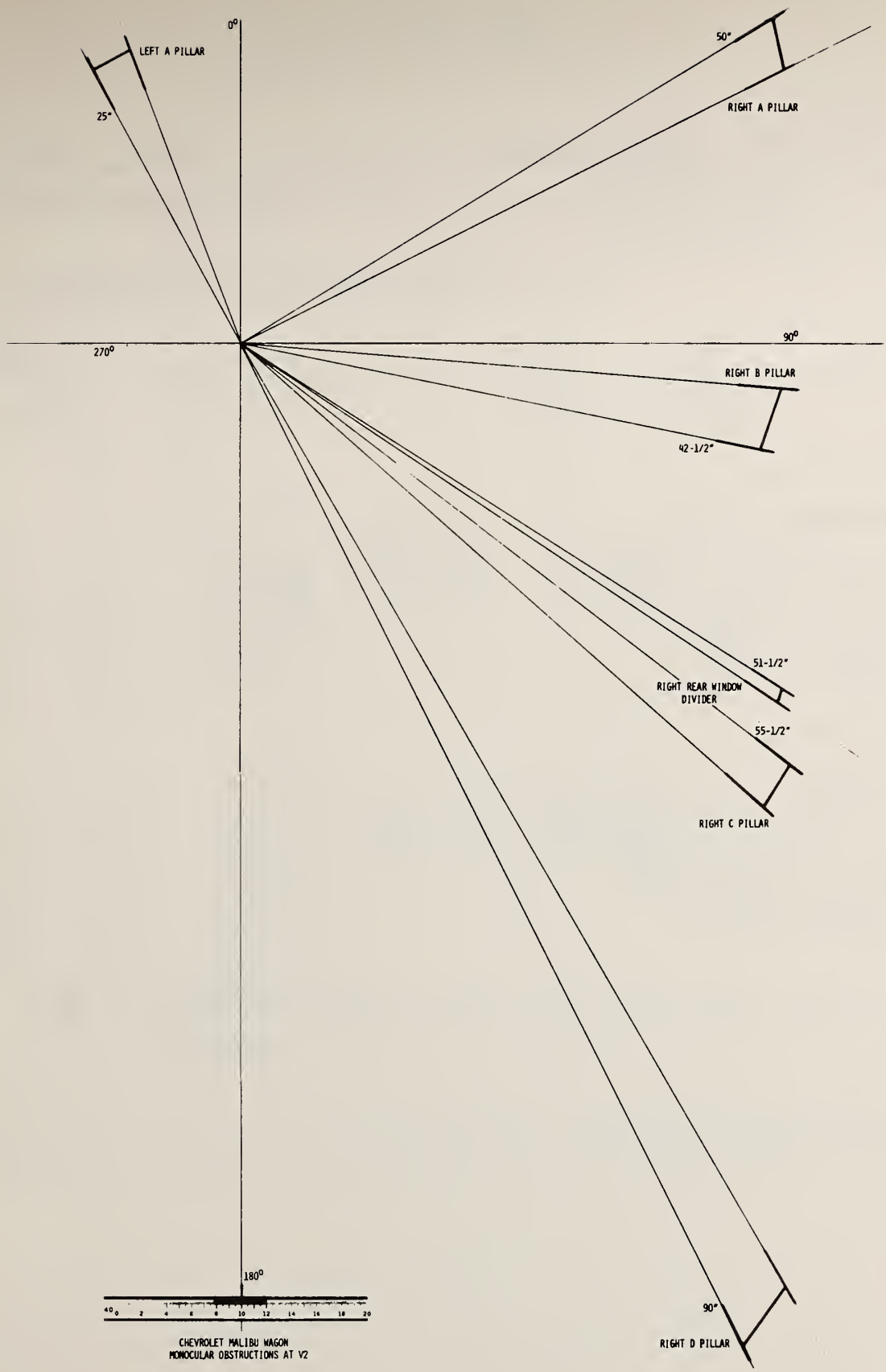
LOCATION OF "V" POINT RELATIVE TO THE "R" Point

	V_1	V_2
X	3.01	3.01
Y	-0.20	-0.20
Z	26.68	23.68

OBSTRUCTIONS: Zone IV

Elevation	Obstruction	Left Angle	Right Angle	Obstruction Angle
V_2	Right B Pillar	94°51'	101°30'	6°39'
	Right Rear Window Divider	122°27'	123°43'	1°16'
	Right C Pillar	127°29'	131°27'	3°58'
	Right D Pillar	150°08'	153°23'	3°15'
			Total	15°08'

Explanations Pertinent to the Specific Measurements:



Plan View of Monocular Obstructions at V_2 - Chevrolet Malibu Wagon.

DATA SHEET 4

BINOCULAR OBSTRUCTION ANGLES

VEHICLE:

MANUFACTURER General Motors YEAR 1978

MODEL Chevrolet Malibu BODY STYLE Station Wagon

VIN 1W35U8K541999

	Dimensions Relative "R" Point		
	X	Y	Z
P_1	-0.15	-0.80	24.56
P_2	+0.95	+1.85	24.56

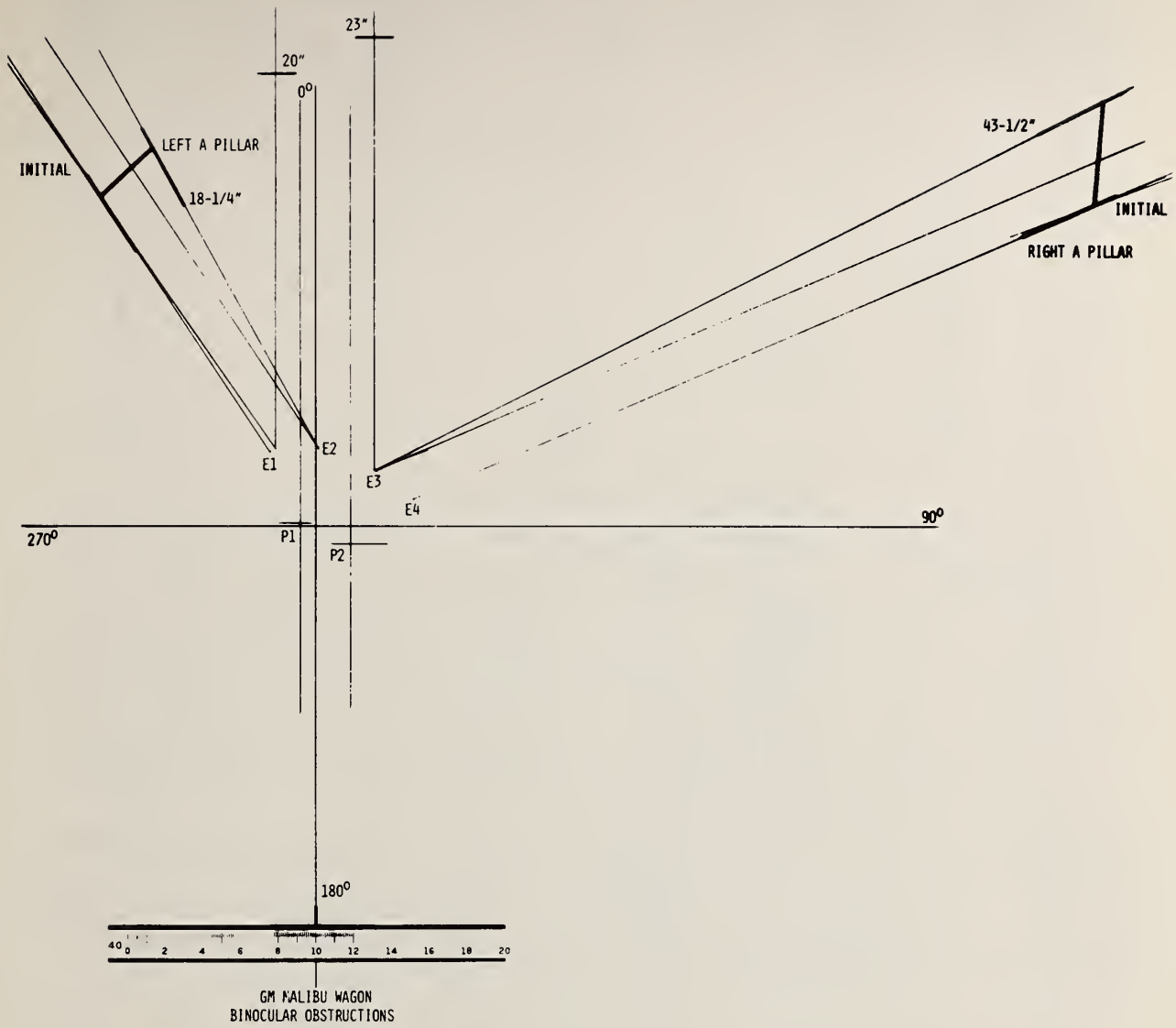
Zone: I

Obstruction	Left A Pillar		
Initial Sight to Outboard E - Rear Side	325°45'		
Adjusted Sight to Outboard E - Rear Side	330°03'		
Inboard E - Front Side	334°55'		
Angle to Bench Mark			
Obstruction Angle	4°52'		
Azimuth			

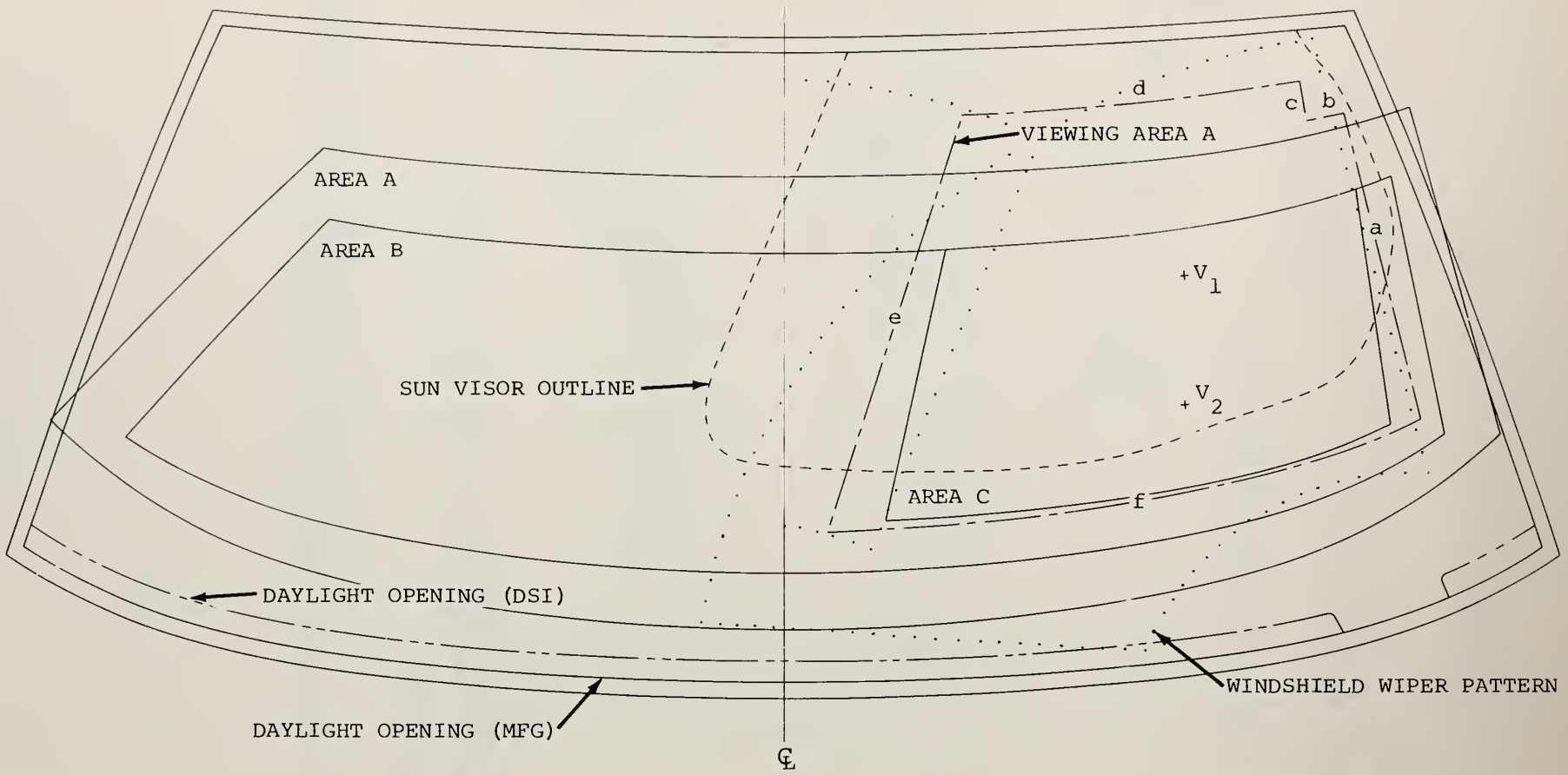
Zone: II

Obstruction	Right A Pillar		
Initial Sight to Outboard E - Rear Side	69°25'		
Adjusted Sight to Outboard E - Rear Side	29°34'		
Inboard E - Front Side	26°34'		
Angle to Bench Mark			
Obstruction Angle	3°00'		
Azimuth			

Explanations Pertinent to the Specific Measurements:



Plan View of Binocular Obstructions - Chevrolet Malibu Wagon.



Windshield Overlay Showing Relationship Between Critical Areas per FMVSS 104 and View Area A as Measured for This Vehicle - Chevrolet Malibu Wagon.

DATA SHEET 3

WINDSHIELD AREAS

VEHICLE:

MANUFACTURER General Motors YEAR 1978

MODEL Chevrolet Malibu BODY STYLE Station Wagon

VIN 1W35U8K541999

VIEW AREA DIMENSIONAL MEASUREMENTS

Relative to Windshield Points

"A" Pillar to Side a 2.9

"A" Pillar to Side c 2.7

DLO Top of Windshield to Side d 3.1

DLO Bottom of Windshield to Side f 6.6

Relative to Critical A, B, C Areas

	A	B	C
Side a Leftward to	3.0	0.85	-1.2
Side c Leftward to	(side c is above the A, B, C areas)		
Side e Rightward to	25.0	23.8	-1.1
Side d Upward to	-2.85	-5.3	-5.3
Side f Downward to	3.9	1.7	-0.2

Critical Areas (A, B, C) Relative to Windshield Points

	A	B	C
"A" Pillar to	0.0	2.1	4.1
DLO Top of Windshield to	4.8	7.8	7.8
DLO Bottom of Windshield to	2.6	4.8	6.8

Left Front Three-Quarter View - 1978 Chevrolet Malibu 4-Door Station Wagon.

Right Rear Three-Quarter View - 1978 Chevrolet Malibu 4-Door Station Wagon.

APPENDIX C

VISIBILITY MEASUREMENTS ON FORD MOTOR COMPANY VEHICLES

APPENDIX C1 - FORD FAIRMONT

DATA SHEET NO. 1 - VEHICLE DATA

VEHICLE:

MANUFACTURER Ford YEAR 1978

MODEL Fairmont BODY STYLE 2-Door Sedan

VIN 3A91Y147090 ODOMETER 00718

BUILD DATE

SPECIAL OPTIONS

FRONT SEAT TYPE: Bench

TILT STEERING WHEEL? YES ____ NO X

FRONT SEAT TRAVEL RANGE: 5.46 in.

FRONT SEAT BACK ANGLE: 25°

MEASURING POINT CORRECTIONS

	X (in.)	Z (in.)
P From Table 2	-1.26	--
P From Table 3	0.0	0.0
Total P	-1.26	0.0
V From Table 3	0.0	0.0

MANUFACTURER'S REFERENCE POINTS FOR SRP (Base Seat)

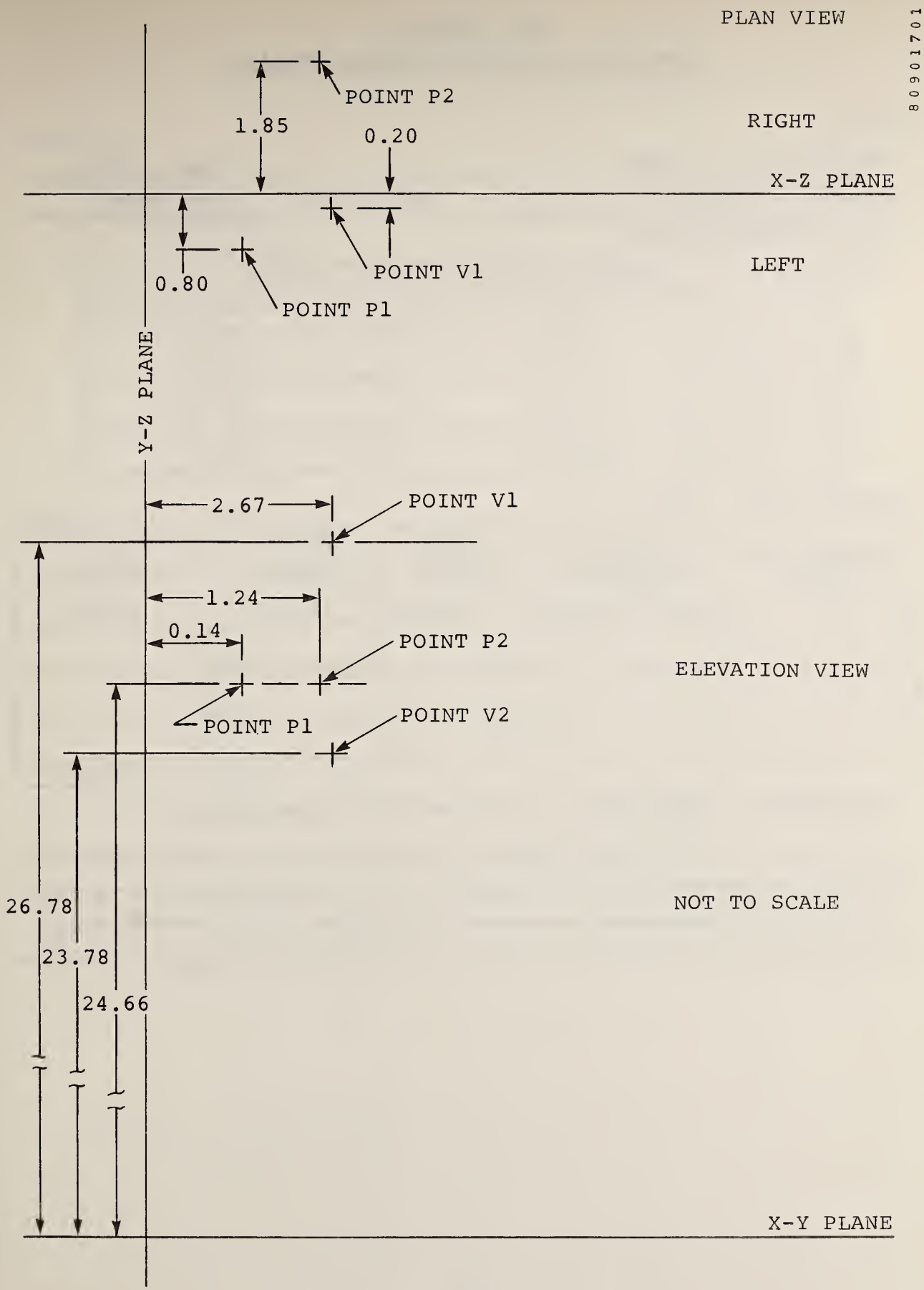
For X 40.71 in. from Zero X Plane L31

For Y -14.02 in. from Zero Y Plane W20

For Z 6.26 in. from Zero Z Plane H70

MANUFACTURER'S DIMENSIONS FOR VEHICLE ATTITUDE AND SRP LOCATION

	From Front Axle Centerline	From Vehicle Centerline	Height Above Ground at Design Load
Front Station	31.5 in.	--	10.66 in.
Rear Station	78.0 in.	--	10.17 in.
Master Control Notch	31.5 in.	--	--
SRP	54.71 in.	-14.02 in.	18.26 in.
"R" Point	54.71 in.	-15.10 in.	18.26 in.



Relationship of Reference Points -
1978 Ford Fairmont 2-door Sedan.

DATA SHEET 2

MONOCULAR OBSTRUCTION ANGLE FROM V_1

VEHICLE:

MANUFACTURER Ford YEAR 1978

MODEL Fairmont BODY STYLE 2 Door Sedan

VIN 3A91Y147090

LOCATION OF "V" POINT RELATIVE TO THE "R" Point

	V_1	V_2
X	2.67	2.67
Y	-0.20	-0.20
Z	26.78	23.78

OBSTRUCTIONS: Zone I

Elevation	Obstruction	Left Angle	Right Angle	Obstruction Angle
V_1	Left A Pillar	322°52'	333°10'	10°18'

Total 10°18'

Explanations Pertinent to the Specific Measurements:

DATA SHEET 2

MONOCULAR OBSTRUCTION ANGLE FROM V_1

VEHICLE:

MANUFACTURER Ford YEAR 1978

MODEL Fairmont BODY STYLE 2 Door Sedan

VIN 3A91Y147090

LOCATION OF "V" POINT RELATIVE TO THE "R" Point

	V_1	V_2
X	2.67	2.67
Y	-0.20	-0.20
Z	26.78	23.78

OBSTRUCTIONS: Zone II

Elevation	Obstruction	Left Angle	Right Angle	Obstruction Angle
V_1	Right A Pillar	65°03'	70°28'	5°25'

Total 5°25'

Explanations Pertinent to the Specific Measurements:

The rear view mirror is slightly above (1/16 of an inch) the V_1 plane and, therefore, was not included as a monocular obstruction. The mirror occupies the position from 29°08' to 52°32'.

DATA SHEET 2

MONOCULAR OBSTRUCTION ANGLE FROM V_1

VEHICLE:

MANUFACTURER Ford YEAR 1978

MODEL Fairmont BODY STYLE 2 Door Sedan

VIN 3A91Y147090

LOCATION OF "V" POINT RELATIVE TO THE "R" Point

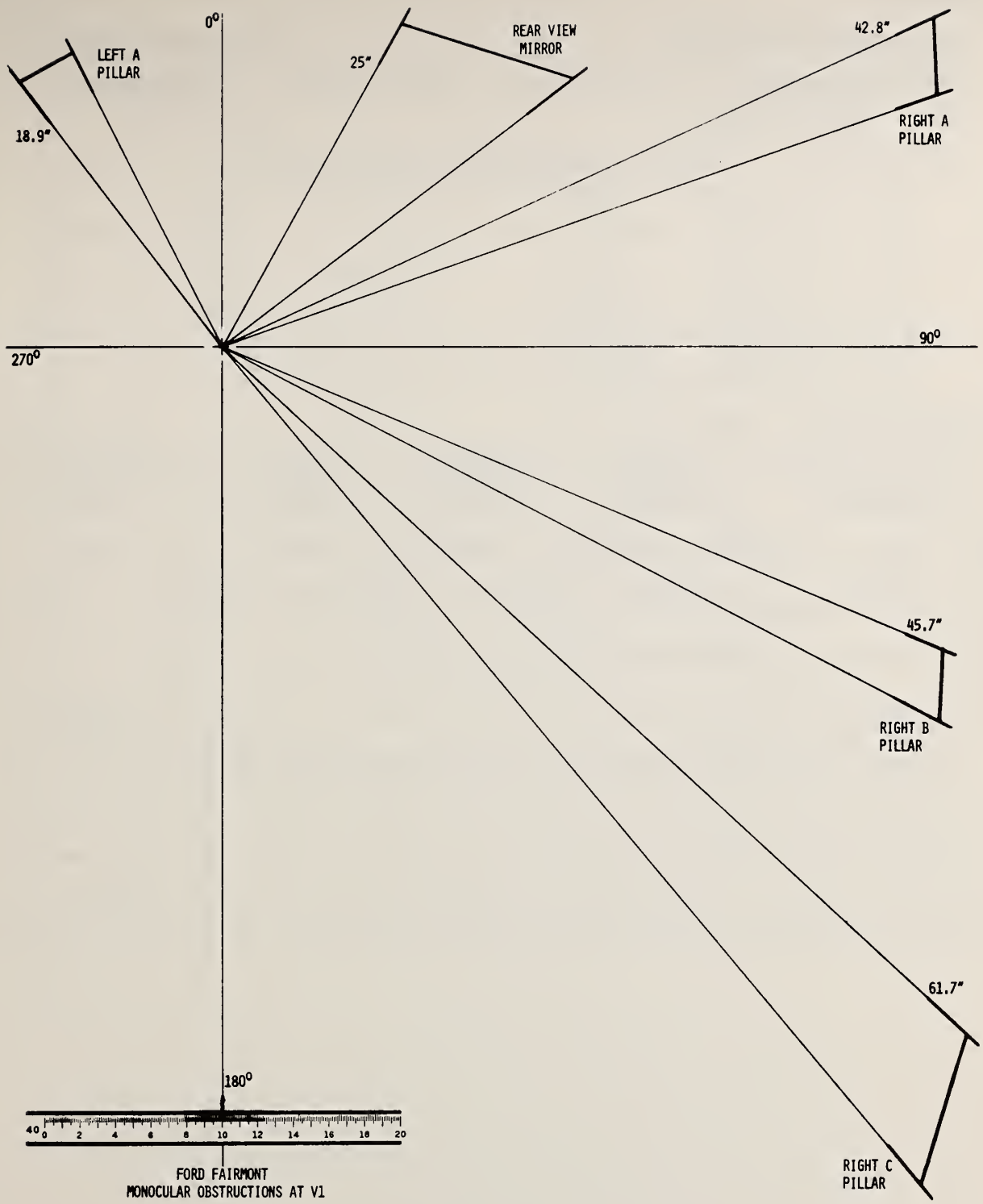
	V_1	V_2
X	2.67	2.67
Y	-0.20	-0.20
Z	26.78	23.78

OBSTRUCTIONS: Zone IV

Elevation	Obstruction	Left Angle	Right Angle	Obstruction Angle
V_1	Right B Pillar	112°47'	117°40'	4°53'
	Right C Pillar	132°58'	140°08'	7°10'

Total 12°03'

Explanations Pertinent to the Specific Measurements:



Plan View of Monocular Obstructions at V_1 - Ford Fairmont.

DATA SHEET 2

MONOCULAR OBSTRUCTION ANGLE FROM V_2

VEHICLE:

MANUFACTURER Ford YEAR 1978

MODEL Fairmont BODY STYLE 2 Door Sedan

VIN 3A91Y147090

LOCATION OF "V" POINT RELATIVE TO THE "R" Point

	V_1	V_2
X	2.67	2.67
Y	-0.20	-0.20
Z	26.78	23.78

OBSTRUCTIONS: Zone I

Elevation	Obstruction	Left Angle	Right Angle	Obstruction Angle
V_2	Left A Pillar	326°04'	334°36'	8°32'

Total 8°32'

Explanations Pertinent to the Specific Measurements:

DATA SHEET 2

MONOCULAR OBSTRUCTION ANGLE FROM V_2

VEHICLE:

MANUFACTURER Ford YEAR 1978

MODEL Fairmont BODY STYLE 2 Door Sedan

VIN 3A91Y147090

LOCATION OF "V" POINT RELATIVE TO THE "R" Point

	V_1	V_2
X	2.67	2.67
Y	-0.20	-0.20
Z	26.78	23.78

OBSTRUCTIONS: Zone II

Elevation	Obstruction	Left Angle	Right Angle	Obstruction Angle
V_2	Right A Pillar	61°42'	66°55'	5°13'

Total 5°13'

Explanations Pertinent to the Specific Measurements:

DATA SHEET 2

MONOCULAR OBSTRUCTION ANGLE FROM V_2

VEHICLE:

MANUFACTURER Ford YEAR 1978

MODEL Fairmont BODY STYLE 2 Door Sedan

VIN 3A91Y147090

LOCATION OF "V" POINT RELATIVE TO THE "R" Point

	V_1	V_2
X	2.67	2.67
Y	-0.20	-0.20
Z	26.78	23.78

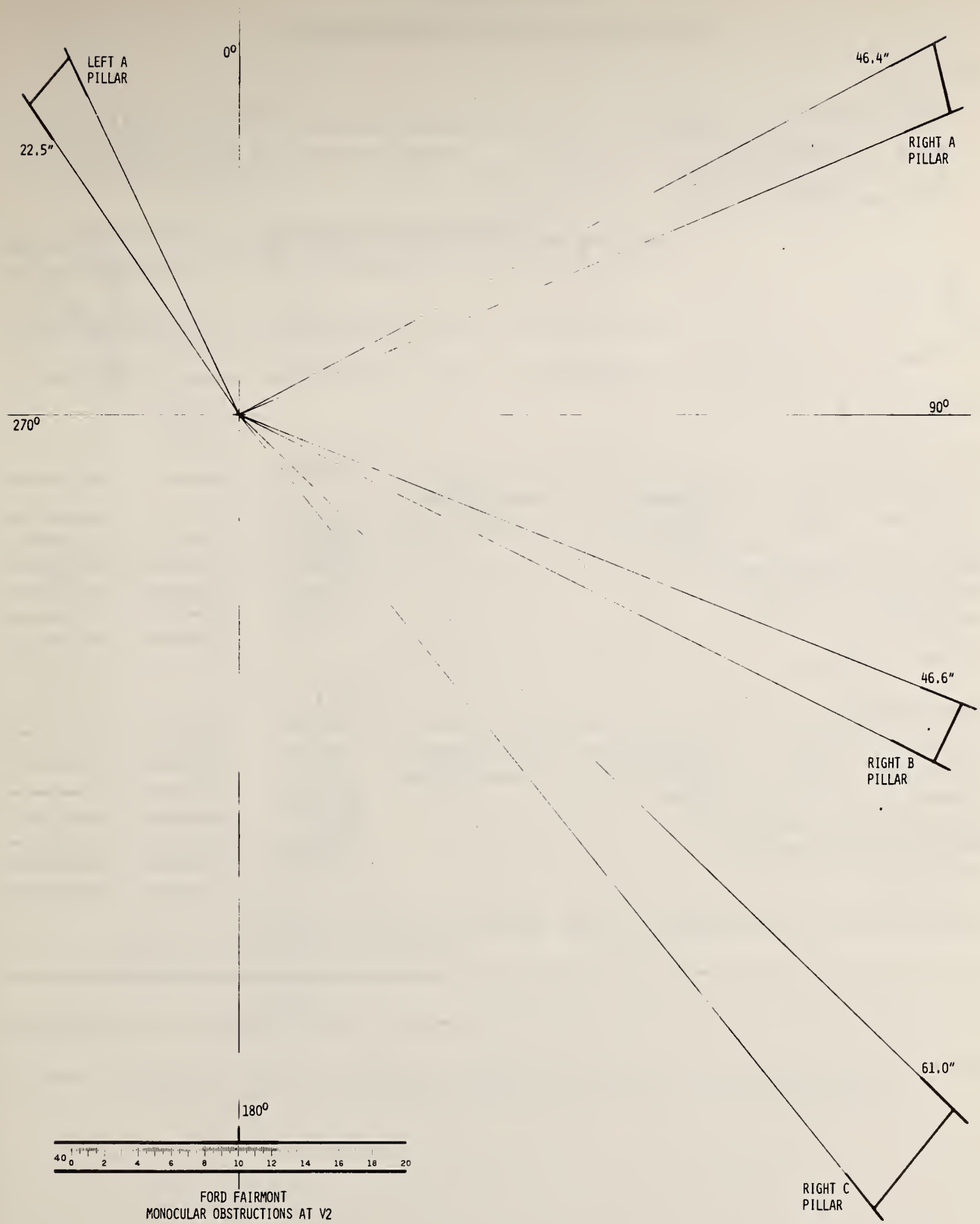
OBSTRUCTIONS: Zone IV

Elevation	Obstruction	Left Angle	Right Angle	Obstruction Angle
V_2	Right B Pillar	111°49'	116°37'	4°48'
	Right C Pillar	134°06'	141°18'	7°12'

Total 12°0'

Explanations Pertinent to the Specific Measurements:

The D-ring for the right shoulder belt was moved to view the Right B Pillar.



Plan View of Monocular Obstructions at V_2 - Ford Fairmont.

DATA SHEET 4

BINOCULAR OBSTRUCTION ANGLES

VEHICLE:

MANUFACTURER Ford YEAR 1978

MODEL Fairmont BODY STYLE 2 Door Sedan

VIN 3A91Y147090

	Dimensions Relative to "R" Point		
	X	Y	Z
P_1	+0.14	-0.80	24.66
P_2	+1.24	+1.85	24.66

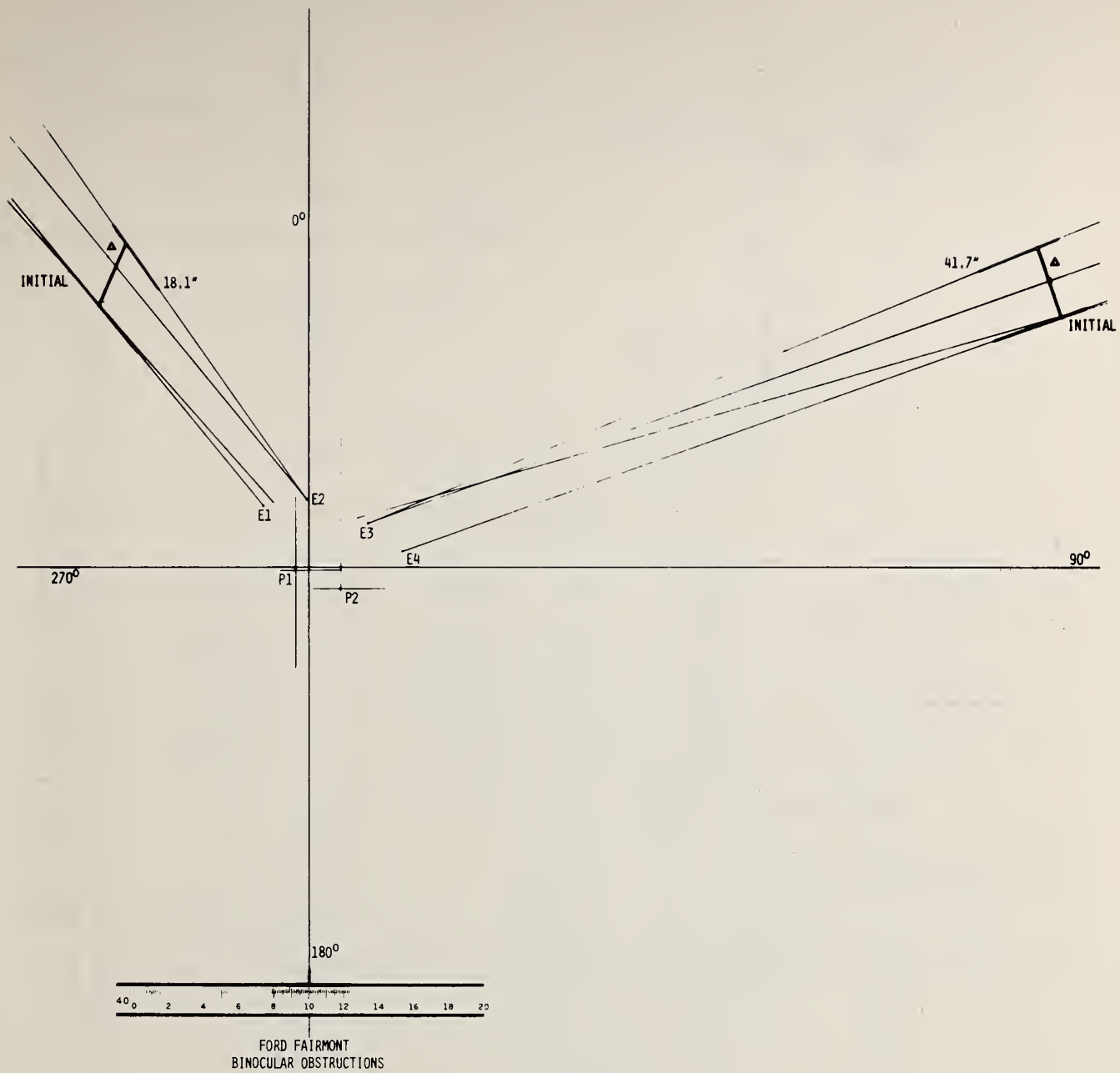
Zone: I

Obstruction	Left A Pillar		
Initial Sight to Outboard E - Rear Side	318°45'		
Adjusted Sight to Outboard E - Rear Side	330°0'		
Inboard E - Front Side	334°09'		
Angle to Bench Mark	90°		
Obstruction Angle	4°09'		
Azimuth			

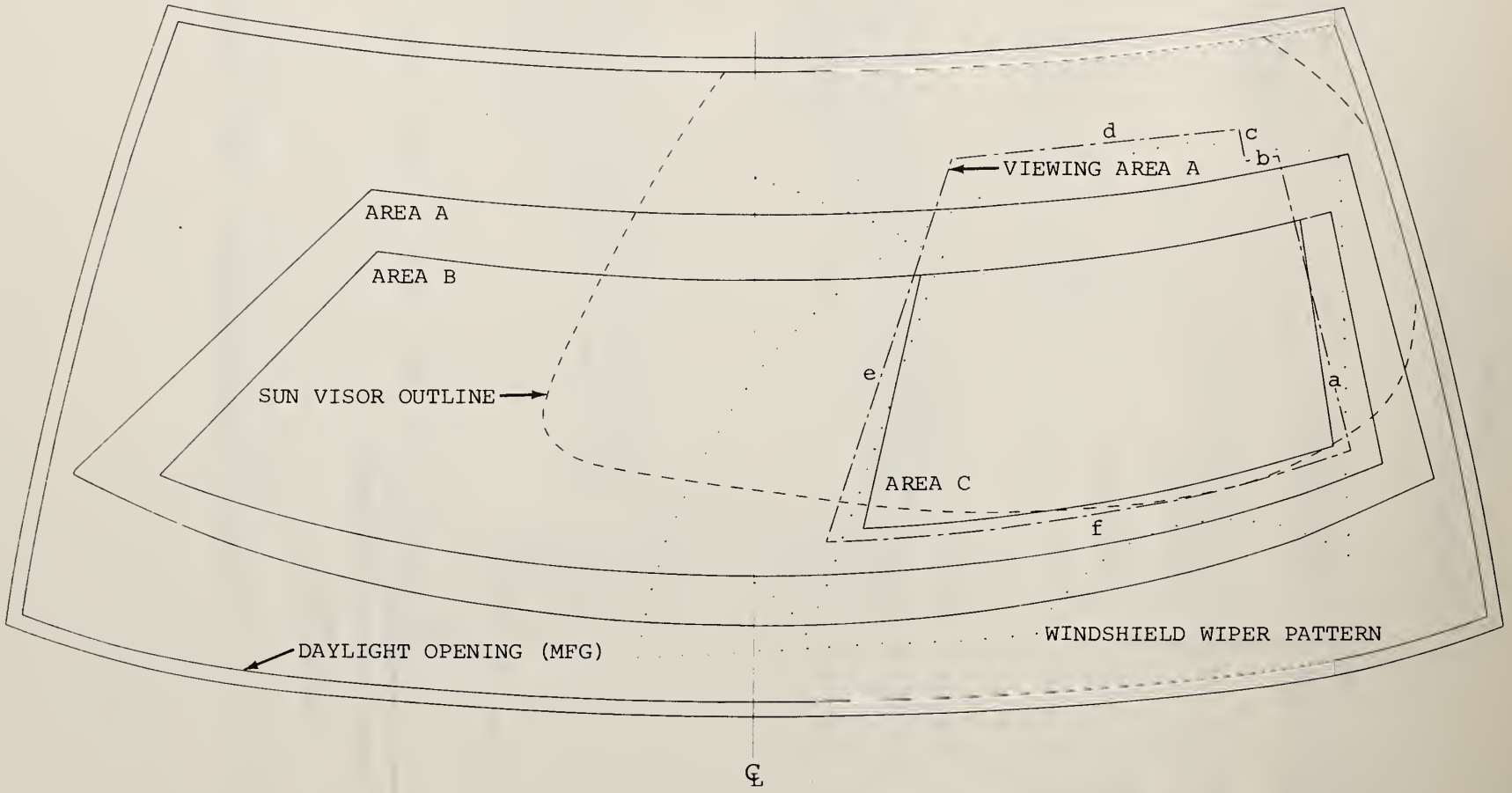
Zone: II

Obstruction	Right A Pillar		
Initial Sight to Outboard E - Rear Side	72°25'		
Adjusted Sight to Outboard E - Rear Side	30°0'		
Inboard E - Front Side	27°04'		
Angle to Bench Mark	90°		
Obstruction Angle	2°56'		
Azimuth			

Explanations Pertinent to the Specific Measurements:



Plan View of Binocular Obstructions - Ford Fairmont.



Windshield Overlay Showing Relationship Between Critical Areas per FMVSS 104 and View Area A as Measured for This Vehicle - Ford Fairmont.

DATA SHEET 3

WINDSHIELD AREAS

VEHICLE:

MANUFACTURER Ford YEAR 1978

MODEL Fairmont BODY STYLE 2 Door Sedan

VIN 3A91Y147090

VIEW AREA DIMENSIONAL MEASUREMENTS

Relative to Windshield Points

"A" Pillar to Side a 4.14

"A" Pillar to Side c 5.07

DLO Top of Windshield to Side d 3.43

DLO Bottom of Windshield to Side f 6.96

Relative to Critical A, B, C Areas

	A	B	C
Side a Leftward to	2.92	1.15	-0.63
Side c Leftward to	3.94	2.91	1.86
Side e Rightward to	22.38	21.30	-0.27
Side d Upward to	-2.10	-4.52	-4.52
Side f Downward to	3.14	1.26	-0.42

Critical Areas (A, B, C) Relative to Windshield Points

	A	B	C
"A" Pillar to	1.22	2.99	4.75
DLO Top of Windshield to	5.53	7.95	7.95
DLO Bottom of Windshield to	3.82	5.70	7.38

Left Front Three-Quarter View - 1978 Ford Fairmont 2-Door Sedan.

Right Rear Three-Quarter View - 1978 Ford Fairmont 2-Door Sedan.

APPENDIX C2 - FORD FIESTA

DATA SHEET NO. 1 - VEHICLE DATA

VEHICLE:

MANUFACTURER Ford YEAR 1978

MODEL Fiesta BODY STYLE 2 Door Sedan (Base)

VIN GCFBTB66526 ODOMETER 00826

BUILD DATE 5/77

SPECIAL OPTIONS

FRONT SEAT TYPE: Bucket

TILT STEERING WHEEL? YES ____ NO X

FRONT SEAT TRAVEL RANGE: (H-Point Travel) 4.75 (120.7mm)

FRONT SEAT BACK ANGLE: 24°

MEASURING POINT CORRECTIONS

	X (in.)	Z (in.)
P From Table 2	-0.88	NA
P From Table 3	-0.34	+0.10
Total P	-1.22	+0.10
V From Table 3	-0.34	+0.10

MANUFACTURER'S REFERENCE POINTS FOR SRP

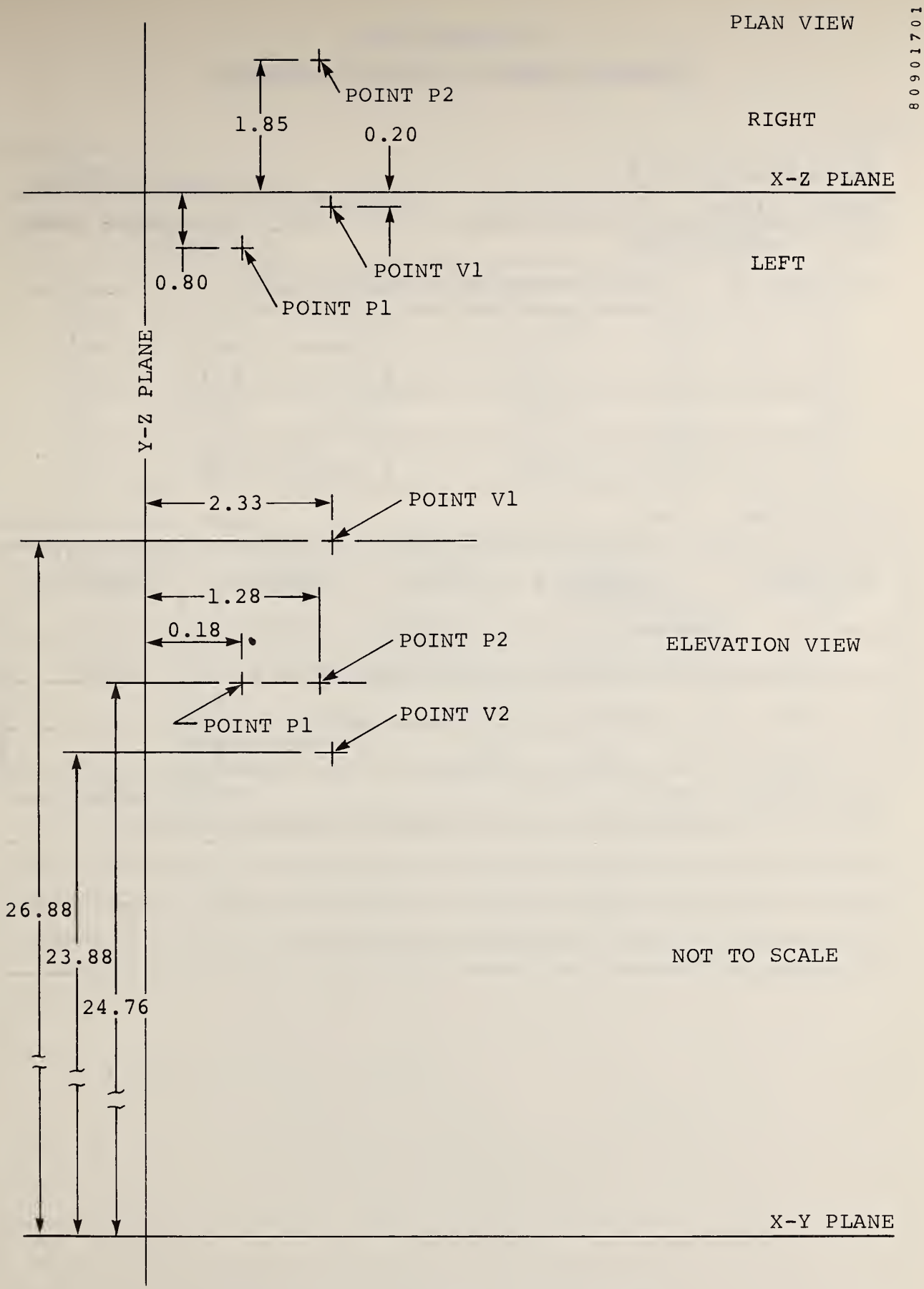
For X 40.90 in. (1038.9mm) to Zero X Plane L31

For Y -12.00 in. (-304.8mm) to Zero Y Plane W20

For Z 7.20 in. (182.9mm) to Zero Z Plane H70

MANUFACTURER'S DIMENSIONS FOR VEHICLE ATTITUDE AND SRP LOCATION

	From Front Axle Centerline	From Vehicle Centerline	Height Above Ground at Design Load
Front Station	37.42 in.	-27.008 in.	10.63 in.
Rear Station	66.94 in.	-27.008 in.	10.54 in.
Master Control Notch	NA	NA	NA
SRP	50.76 in.	-12.0 in.	18.37 in.
"R" Point	50.76 in.	-12.0 in.	18.37 in.



Relationship of Reference Points -
1978 Ford Fiesta 2-Door Hatchback Sedan.

DATA SHEET 2

MONOCULAR OBSTRUCTION ANGLE FROM V_1

VEHICLE:

MANUFACTURER Ford YEAR 1978

MODEL Fiesta BODY STYLE 2 Door Sedan (Base)

VIN GCFBTB66526

LOCATION OF "V" POINT RELATIVE TO THE "R" Point

	V_1	V_2
X	2.33	2.33
Y	-0.20	-0.20
Z	+26.88	+23.88

OBSTRUCTIONS: Zone I

Elevation	Obstruction	Left Angle	Right Angle	Obstruction Angle
V_1	Left Window Divider	319°28'	322°56'	3°28'
	Left A Pillar	324°03'	334°10'	10°07'

Total 13°35'

Explanations Pertinent to the Specific Measurements:

DATA SHEET 2

MONOCULAR OBSTRUCTION ANGLE FROM V_1

VEHICLE:

MANUFACTURER Ford YEAR 1978

MODEL Fiesta BODY STYLE 2 Door Sedan (Base)

VIN GCFBTB66526

LOCATION OF "V" POINT RELATIVE TO THE "R" Point

	V_1	V_2
X	2.33	2.33
Y	-0.20	-0.20
Z	+26.88	+23.88

OBSTRUCTIONS: Zone II

Elevation	Obstruction	Left Angle	Right Angle	Obstruction Angle
V_1	Rear View Mirror	25°41'	43°36'	17°55'
	Right A Pillar	60°01'	67°24'	7°23'
	Right Window Divider	68°35'	70°11'	1°36'
			Total	26°54'

Explanations Pertinent to the Specific Measurements:

DATA SHEET 2

MONOCULAR OBSTRUCTION ANGLE FROM V_1

VEHICLE:

MANUFACTURER Ford YEAR 1978

MODEL Fiesta BODY STYLE 2 Door Sedan (Base)

VIN GCFBTB66526

LOCATION OF "V" POINT RELATIVE TO THE "R" Point

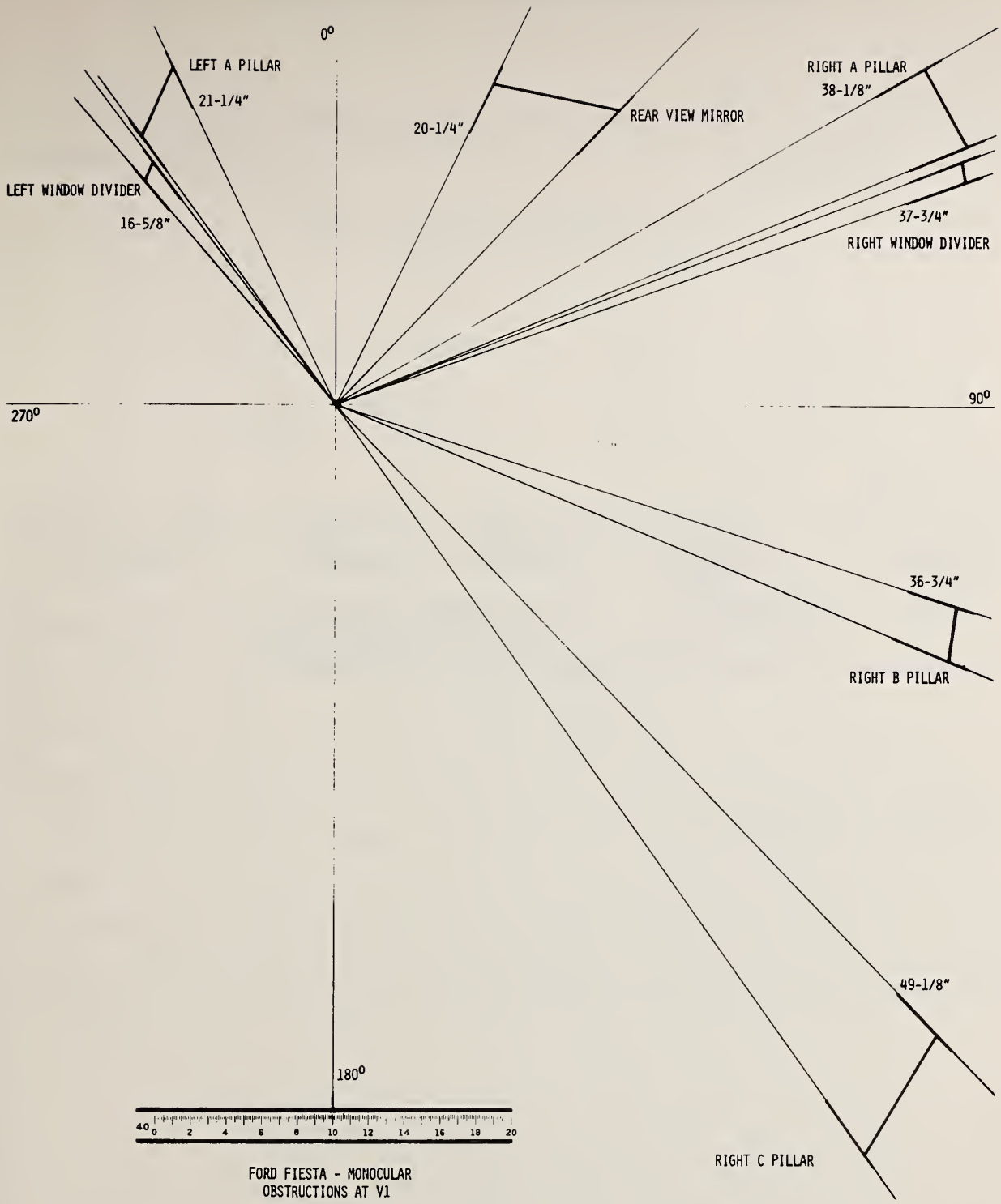
	V_1	V_2
X	2.33	2.33
Y	-0.20	-0.20
Z	+26.88	+23.88

OBSTRUCTIONS: Zone IV

Elevation	Obstruction	Left Angle	Right Angle	Obstruction Angle
V_1	Right B Pillar	107°56'	112°37'	4°41'
	Right C Pillar	136°03'	144°42'	8°39'

Total 13°20'

Explanations Pertinent to the Specific Measurements:



Plan View of Monocular Obstructions at V_1 - Ford Fiesta.

DATA SHEET 2

MONOCULAR OBSTRUCTION ANGLE FROM V_2

VEHICLE:

MANUFACTURER Ford YEAR 1978

MODEL Fiesta BODY STYLE 2 Door Sedan (Base)

VIN GCFBTB66526

LOCATION OF "V" POINT RELATIVE TO THE "R" Point

	V_1	V_2
X	2.33	2.33
Y	-0.20	-0.20
Z	+26.88	+23.88

OBSTRUCTIONS: Zone I

Elevation	Obstruction	Left Angle	Right Angle	Obstruction Angle
V_2	Left Window Divider	317°15'	320°35'	3°20'
	Left A Pillar	327°22'	335°32'	8°10'

Total 11°3'

Explanations Pertinent to the Specific Measurements:

DATA SHEET 2

MONOCULAR OBSTRUCTION ANGLE FROM V_2

VEHICLE:

MANUFACTURER Ford YEAR 1978

MODEL Fiesta BODY STYLE 2 Door Sedan (Base)

VIN GCFBTB66526

LOCATION OF "V" POINT RELATIVE TO THE "R" Point

	V_1	V_2
X	2.33	2.33
Y	-0.20	-0.20
Z	+26.88	+23.88

OBSTRUCTIONS: Zone II

Elevation	Obstruction	Left Angle	Right Angle	Obstruction Angle
V_2	Right A Pillar	58°16'	63°10'	4°54'
	Right Window Divider	68°47'	70°20'	1°33'

Total 6°27'

Explanations Pertinent to the Specific Measurements:

DATA SHEET 2

MONOCULAR OBSTRUCTION ANGLE FROM V_2

VEHICLE:

MANUFACTURER Ford YEAR 1978

MODEL Fiesta BODY STYLE 2 Door Sedan (Base)

VIN GCFBTB66526

LOCATION OF "V" POINT RELATIVE TO THE "R" Point

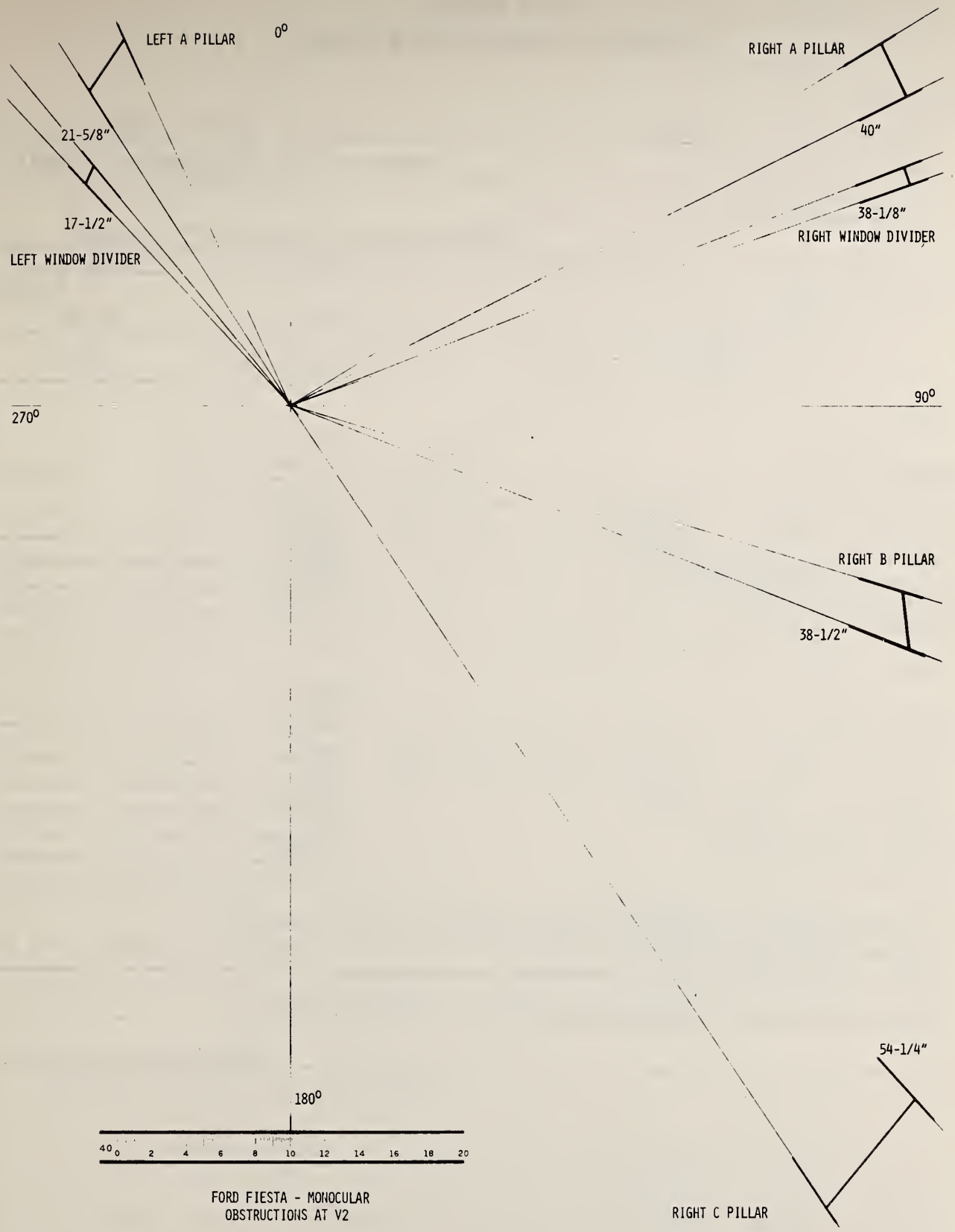
	V_1	V_2
X	2.33	2.33
Y	-0.20	-0.20
Z	+26.88	+23.88

OBSTRUCTIONS: Zone IV

Elevation	Obstruction	Left Angle	Right Angle	Obstruction Angle
V_2	Right B Pillar	106°54'	111°29'	4°35'
	Right C Pillar	137°56'	146°10'	8°14'

Total 12°49'

Explanations Pertinent to the Specific Measurements:



Plan View of Monocular Obstructions at V_2 - Ford Fiesta.

DATA SHEET 4

BINOCULAR OBSTRUCTION ANGLES

VEHICLE:

MANUFACTURER Ford YEAR 1978

MODEL Fiesta BODY STYLE 2 Door Sedan (Base)

VIN GCFBTB66526

	Dimensions Relative to "R" Point		
	X	Y	Z
P_1	0.18	-0.80	24.76
P_2	1.28	+1.85	24.76

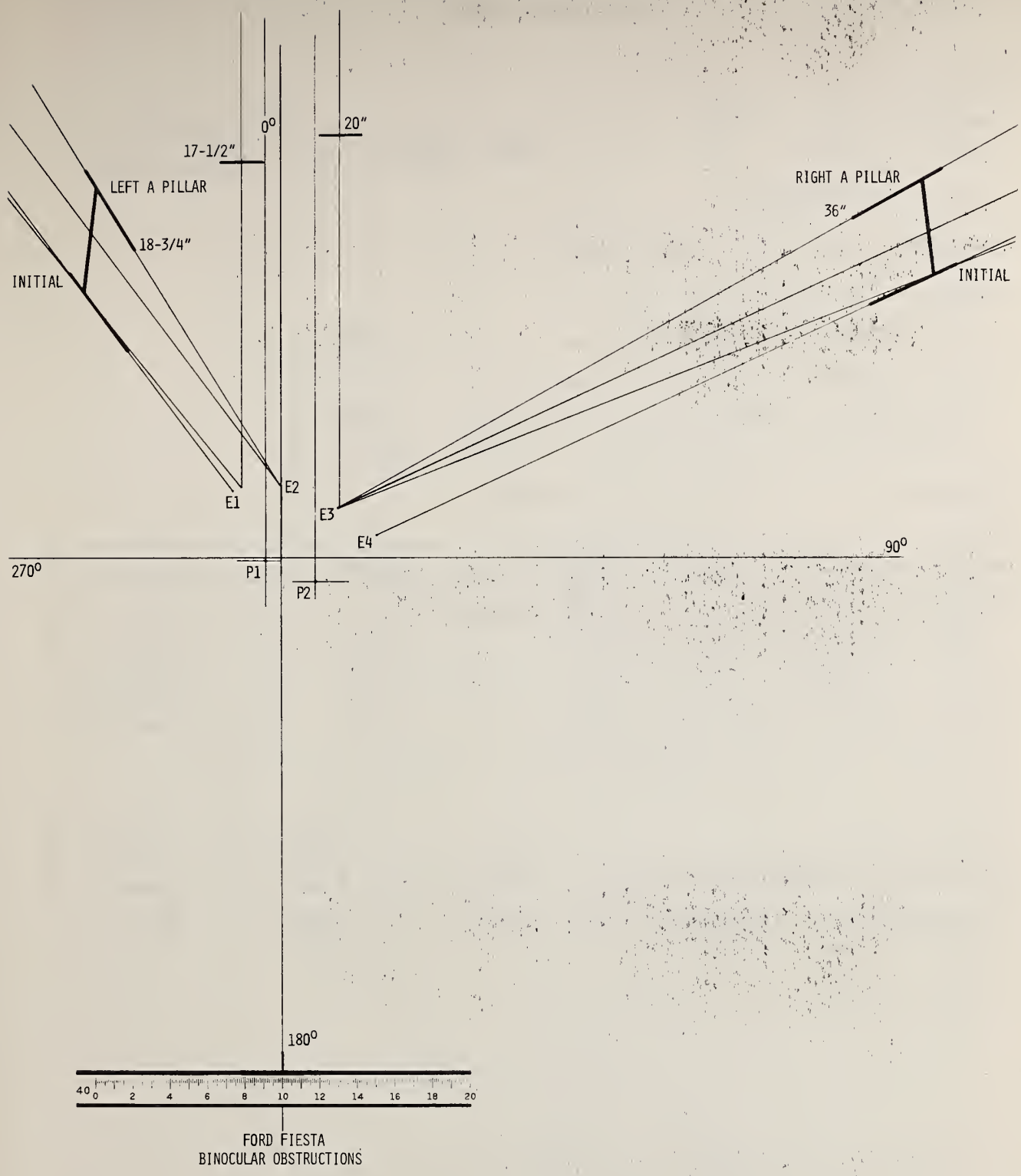
Zone: I

Obstruction	Left A Pillar		
Initial Sight to Outboard E - Rear Side	320°46'		
Adjusted Sight to Outboard E - Rear Side	330°		
Inboard E - Front Side	333°51'		
Angle to Bench Mark	90°		
Obstruction Angle	3°51'		
Azimuth			

Zone: II

Obstruction	Right A Pillar		
Initial Sight to Outboard E - Rear Side	69°22'		
Adjusted Sight to Outboard E - Rear Side	30°		
Inboard E - Front Side	25°12'		
Angle to Bench Mark	270°		
Obstruction Angle	4°48'		
Azimuth			

Explanations Pertinent to the Specific Measurements:
Window dividers shown in Monocular Obstructions at V_2 height are not wide enough to constitute binocular obstructions.



Plan View of Binocular Obstructions - Ford Fiesta.

DATA SHEET 3

WINDSHIELD AREAS

VEHICLE:

MANUFACTURER Ford YEAR 1978

MODEL Fiesta BODY STYLE 2 Door Sedan (Base)

VIN GCFBTB66526

VIEW AREA DIMENSIONAL MEASUREMENTS

Relative to Windshield Points

"A" Pillar to Side a 3.39

"A" Pillar to Side c 4.38

DLO Top of Windshield to Side d 0.66

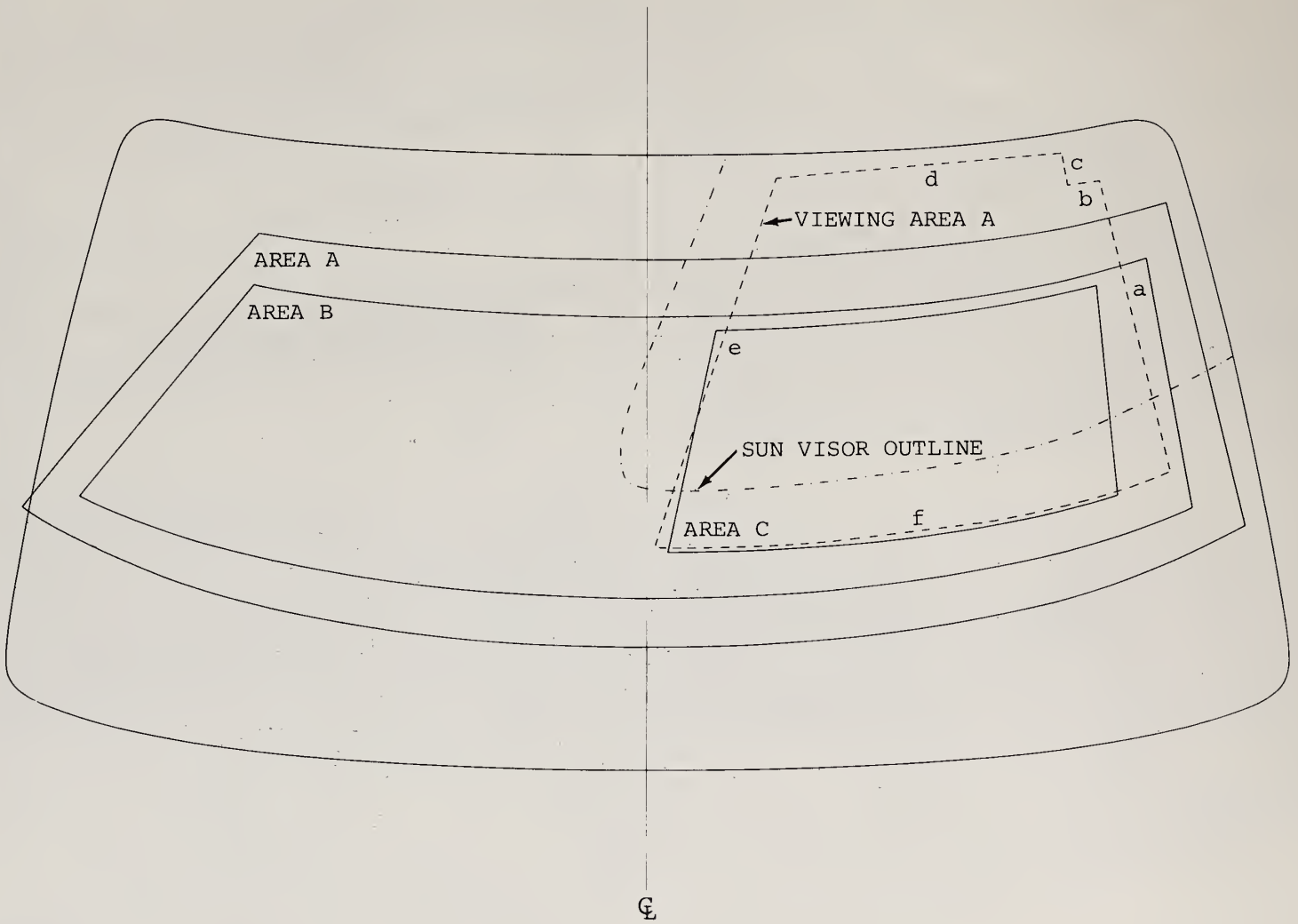
DLO Bottom of Windshield to Side f 9.02

Relative to Critical A, B, C Areas

	A	B	C
Side a Leftward to	2.34	0.59	-2.20
Side c Leftward to	4.66	2.50	0.39
Side e Rightward to	19.13	18.62	0.41
Side d Upward to	-3.18	-5.39	-5.99
Side f Downward to	3.82	1.92	0.25

Critical Areas (A, B, C) Relative to Windshield Points

	A	B	C
"A" Pillar to	0.95	2.83	5.56
DLO Top of Windshield to	3.84	6.05	6.56
DLO Bottom of Windshield to	5.20	7.10	8.77



Windshield Overlay Showing Relationship Between Critical Areas per FMVSS 104 and View Area A as Measured for This Vehicle - Ford Fiesta.

Left Front Three-Quarter View - 1978 Ford Fiesta 2-Door Hatchback Sedan.

Right Rear Three-Quarter View - 1978 Ford Fiesta 2-Door Hatchback Sedan.

APPENDIX C3 - FORD LTD

DATA SHEET NO. 1 - VEHICLE DATA

VEHICLE:

MANUFACTURER Ford YEAR 1978

MODEL LTD BODY STYLE 4 Door Sedan

VIN 8J63H126545 ODOMETER 8156

BUILD DATE 11/77

SPECIAL OPTIONS

FRONT SEAT TYPE: SPECIFIED Bench

TILT STEERING WHEEL? YES ____ NO X

FRONT SEAT TRAVEL RANGE: SPECIFIED 5.50 in.

FRONT SEAT BACK ANGLE: SPECIFIED 26.6°

MEASURING POINT CORRECTIONS

	X (in.)	Z (in.)
P From Table 2	-1.26	-
P From Table 3	+0.68	-0.21
Total P	-0.58	-0.21
V From Table 3	+0.68	-0.21

MANUFACTURER'S REFERENCE POINTS FOR SRP

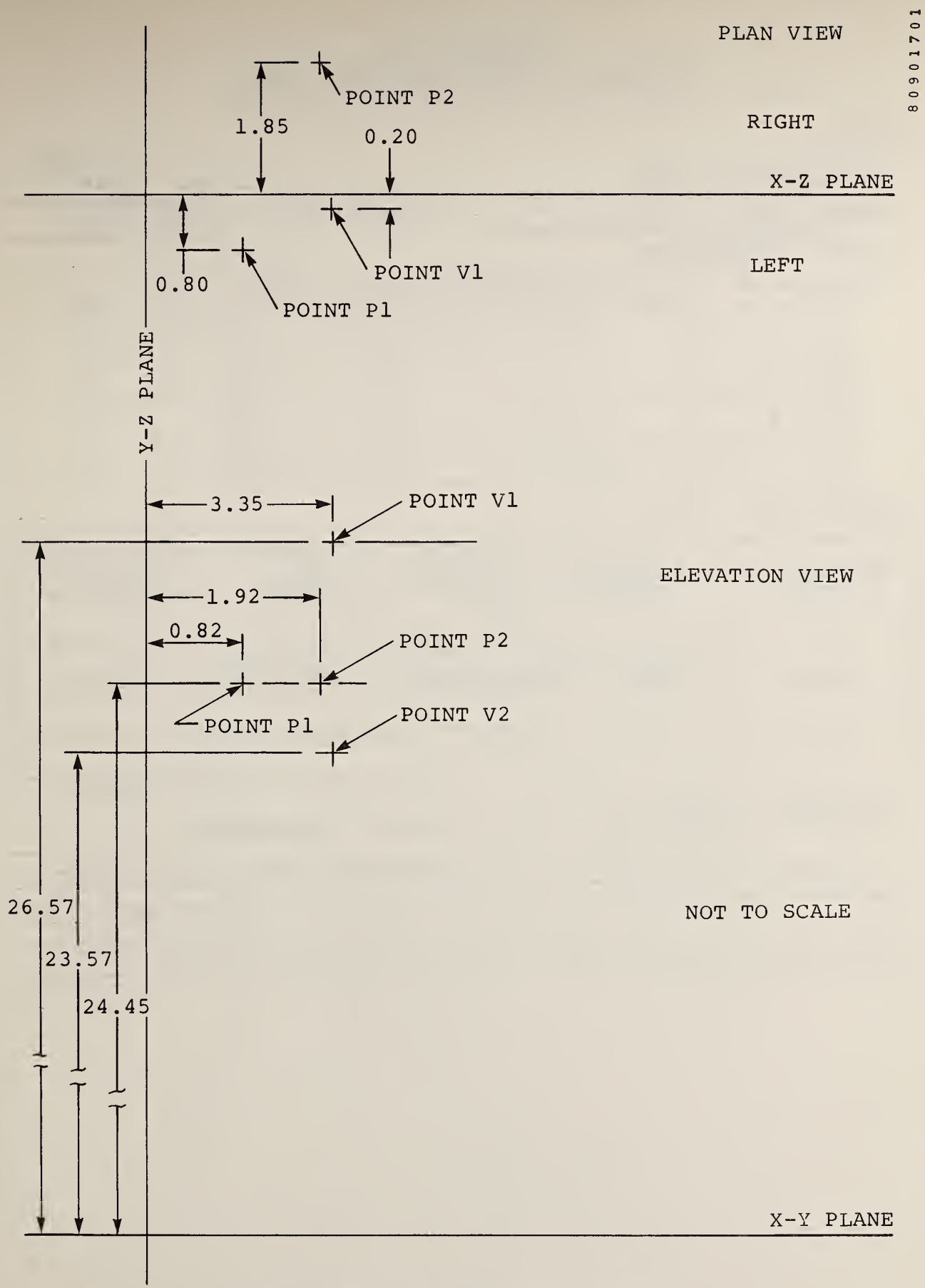
For X 42.94 in. to Zero X Plane L31

For Y -15.00 in. to Zero Y Plane W20

For Z 9.38 in. to Zero Z Plane H70

MANUFACTURER'S DIMENSIONS FOR VEHICLE ATTITUDE AND SRP LOCATION

	From Front Axle Centerline	From Vehicle Centerline	Height Above Ground at Design Load
Front Station	36.5 in.	--	11.04 in.
Rear Station	90.5 in.	--	10.62 in.
Master Control Notch	51.0 in.	-30.16 in.	7.62 in.
SRP	64.4 in.	-15.00 in.	19.49 in.
"R" Point	64.4 in.	-17.57 in.	19.44 in.



Relationship of Reference Points -
1978 Ford LTD 4-Door Pillared Hardtop.

DATA SHEET 2

MONOCULAR OBSTRUCTION ANGLE FROM V_1

VEHICLE:

MANUFACTURER Ford YEAR 1978

MODEL LTD BODY STYLE 4 Door Sedan

VIN 8J63H126545

LOCATION OF "V" POINT RELATIVE TO THE "R" Point

	V_1	V_2
X	3.35	3.35
Y	-0.20	-0.20
Z	26.57	23.57

OBSTRUCTIONS: Zone I

Elevation	Obstruction	Left Angle	Right Angle	Obstruction Angle
V_1	Left A Pillar	326°37'	334°52'	8°15'

Total 8°15'

Explanations Pertinent to the Specific Measurements:

DATA SHEET 2

MONOCULAR OBSTRUCTION ANGLE FROM V_1

VEHICLE:

MANUFACTURER Ford YEAR 1978

MODEL LTD BODY STYLE 4 Door Sedan

VIN 8J63H126545

LOCATION OF "V" POINT RELATIVE TO THE "R" Point

	V_1	V_2
X	3.35	3.35
Y	-0.20	-0.20
Z	26.57	23.57

OBSTRUCTIONS: Zone II

Elevation	Obstruction	Left Angle	Right Angle	Obstruction Angle
V_1	Rear View Mirror*	28°52'	51°59'	23°07'
	Right A Pillar	66°45'	71°54'	5°09'

Total 28°16'

Explanations Pertinent to the Specific Measurements:

*Lower edge of Rear View Mirror is 1/2" below the V_1 plane.

DATA SHEET 2

MONOCULAR OBSTRUCTION ANGLE FROM V_1

VEHICLE:

MANUFACTURER Ford YEAR 1978

MODEL LTD BODY STYLE 4 Door Sedan

VIN 8J63H126545

LOCATION OF "V" POINT RELATIVE TO THE "R" Point

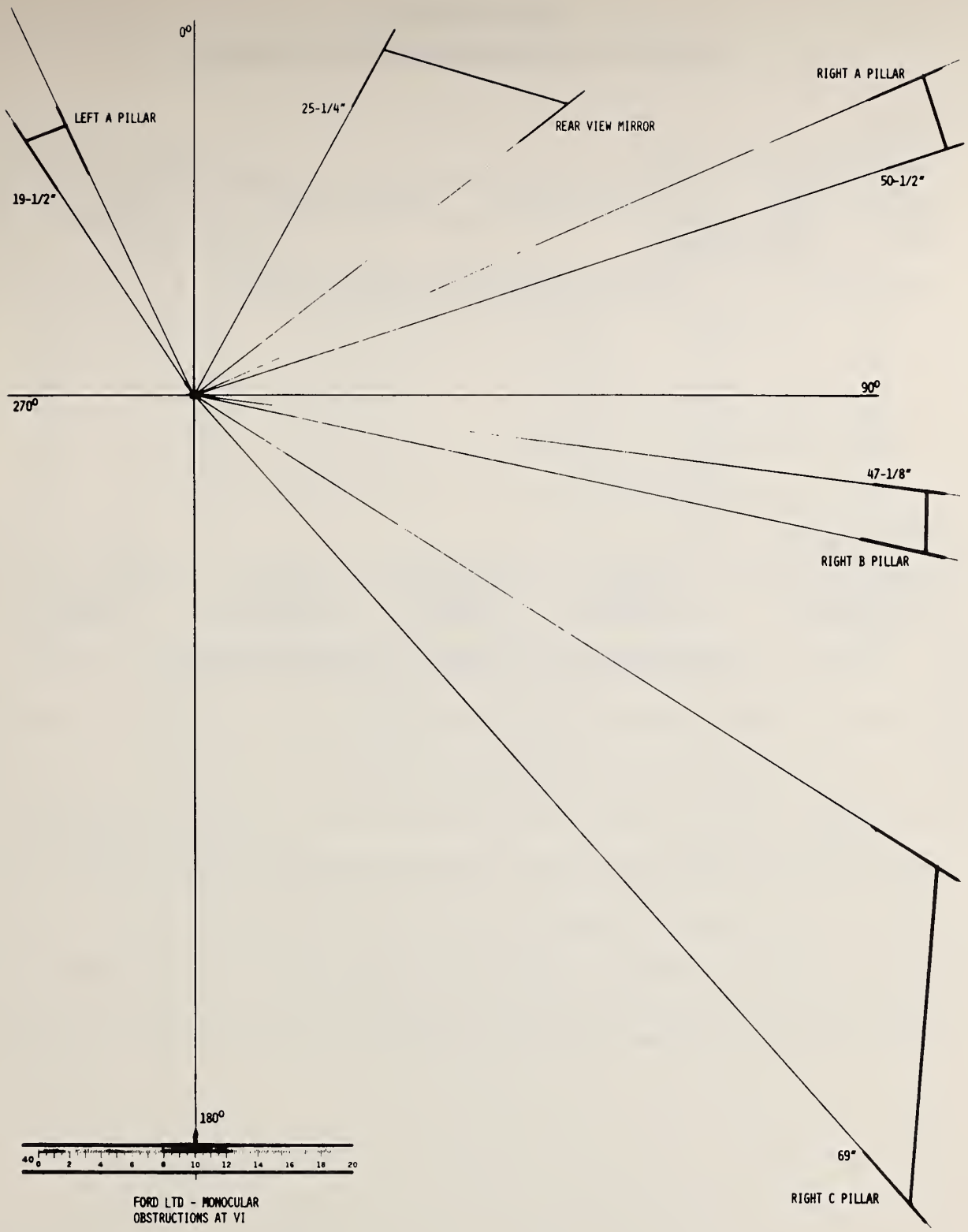
	V_1	V_2
X	3.35	3.35
Y	-0.20	-0.20
Z	26.57	23.57

OBSTRUCTIONS: Zone IV

Elevation	Obstruction	Left Angle	Right Angle	Obstruction Angle
V_1	Right B Pillar	97°32'	102°08'	4°36'
	Right C Pillar	122°33'	138°32'	15°59'

Total 20°35'

Explanations Pertinent to the Specific Measurements:



Plan View of Monocular Obstructions at V_1 - Ford LTD.

DATA SHEET 2

MONOCULAR OBSTRUCTION ANGLE FROM V_2

VEHICLE:

MANUFACTURER Ford YEAR 1978

MODEL LTD BODY STYLE 4 Door Sedan

VIN 8J63H126545

LOCATION OF "V" POINT RELATIVE TO THE "R" Point

	V_1	V_2
X	3.35	3.35
Y	-0.20	-0.20
Z	26.57	23.57

OBSTRUCTIONS: Zone I

Elevation	Obstruction	Left Angle	Right Angle	Obstruction Angle
V_2	Left A Pillar	328°27'	335°29'	7°02'

Total 7°02'

Explanations Pertinent to the Specific Measurements:

DATA SHEET 2

MONOCULAR OBSTRUCTION ANGLE FROM V_2

VEHICLE:

MANUFACTURER Ford YEAR 1978

MODEL LTD BODY STYLE 4 Door Sedan

VIN 8J63H126545

LOCATION OF "V" POINT RELATIVE TO THE "R" Point

	V_1	V_2
X	3.35	3.35
Y	-0.20	-0.20
Z	26.57	23.57

OBSTRUCTIONS: Zone II

Elevation	Obstruction	Left Angle	Right Angle	Obstruction Angle
V_2	Right A Pillar	63°26'	68°16'	4°50'

Total 4°50'

Explanations Pertinent to the Specific Measurements:

DATA SHEET 2

MONOCULAR OBSTRUCTION ANGLE FROM V_2

VEHICLE:

MANUFACTURER Ford YEAR 1978

MODEL LTD BODY STYLE 4 Door Sedan

VIN 8J63H126545

LOCATION OF "V" POINT RELATIVE TO THE "R" Point

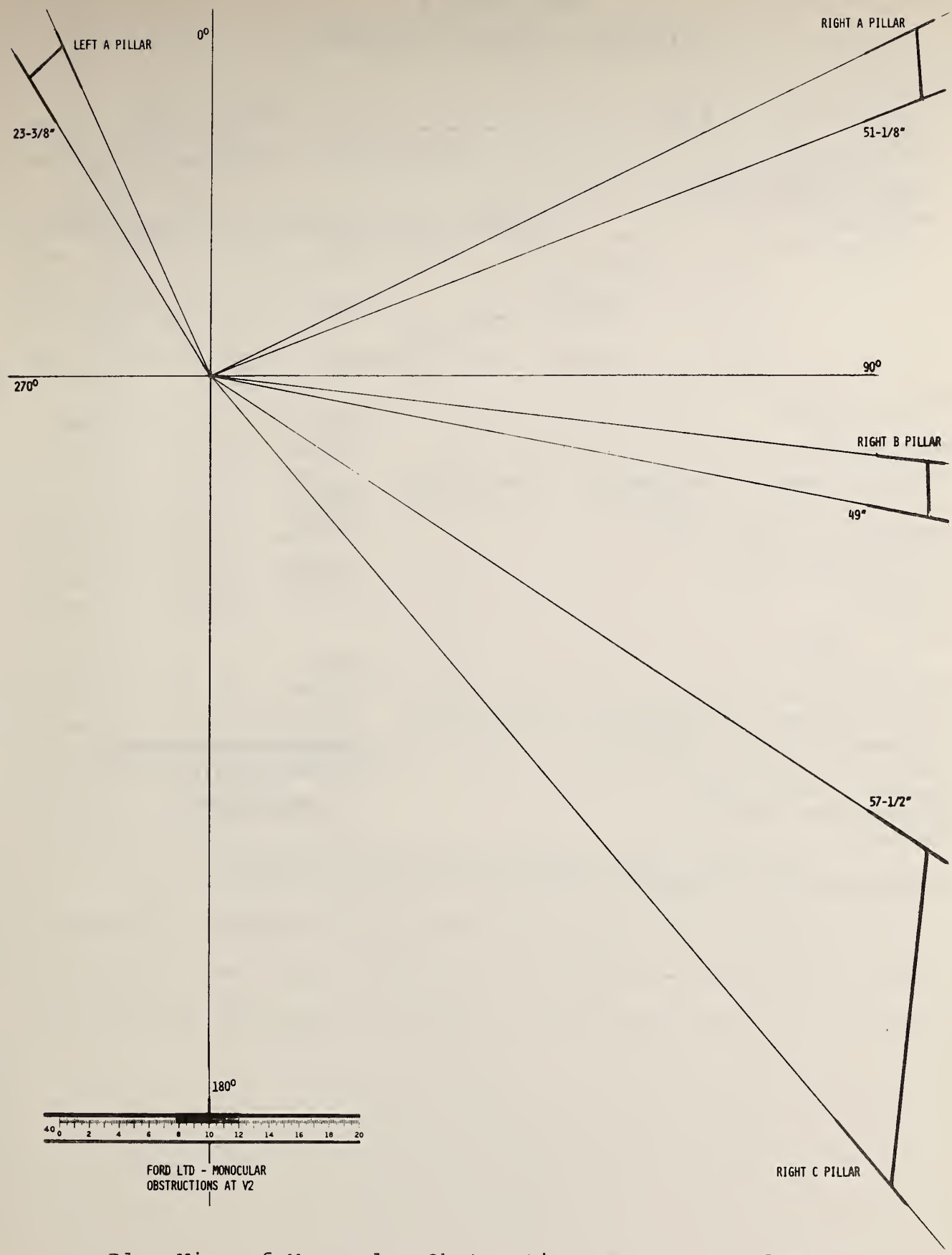
	V_1	V_2
X	3.35	3.35
Y	-0.20	-0.20
Z	26.57	23.57

OBSTRUCTIONS: Zone IV

Elevation	Obstruction	Left Angle	Right Angle	Obstruction Angle
V_2	Right B Pillar	96°29'	100°55'	4°26'
	Right C Pillar	123°08'	139°45'	16°37'

Total 21°03'

Explanations Pertinent to the Specific Measurements:



Plan View of Monocular Obstructions at V_2 - Ford LTD.

DATA SHEET 4

BINOCULAR OBSTRUCTION ANGLES

VEHICLE:

MANUFACTURER Ford YEAR 1978

MODEL LTD BODY STYLE 4 Door Sedan

VIN 8J63H126545

	Dimensions Relative to "R" Point		
	X	Y	Z
P_1	0.82	0.80	24.45
P_2	1.92	1.85	24.45

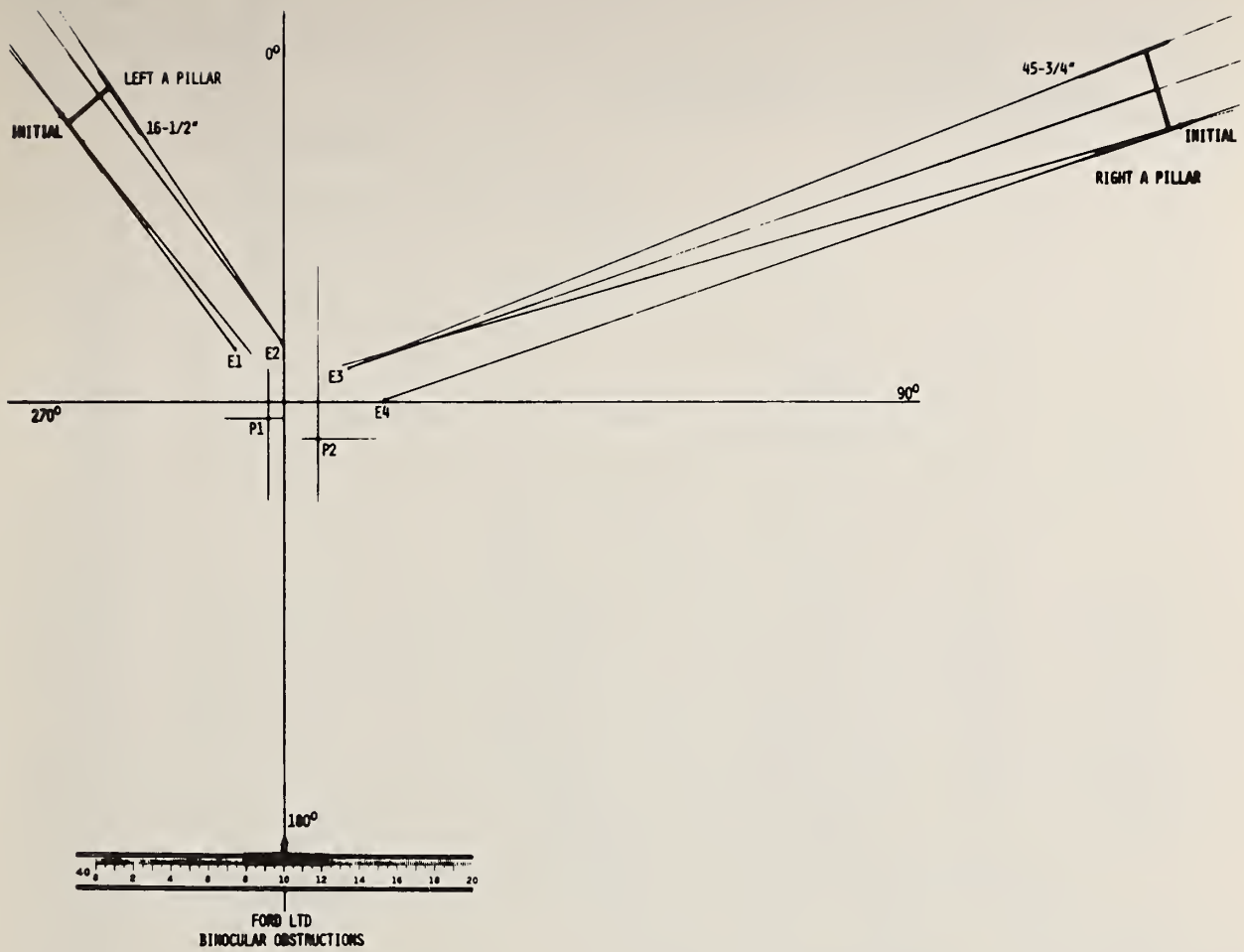
Zone: I

Obstruction	Left A Pillar		
Initial Sight to Outboard E - Rear Side	321°27'		
Adjusted Sight to Outboard E - Rear Side	330°00'		
Inboard E - Front Side	332°43'		
Angle to Bench Mark			
Obstruction Angle	2°43'		
Azimuth			

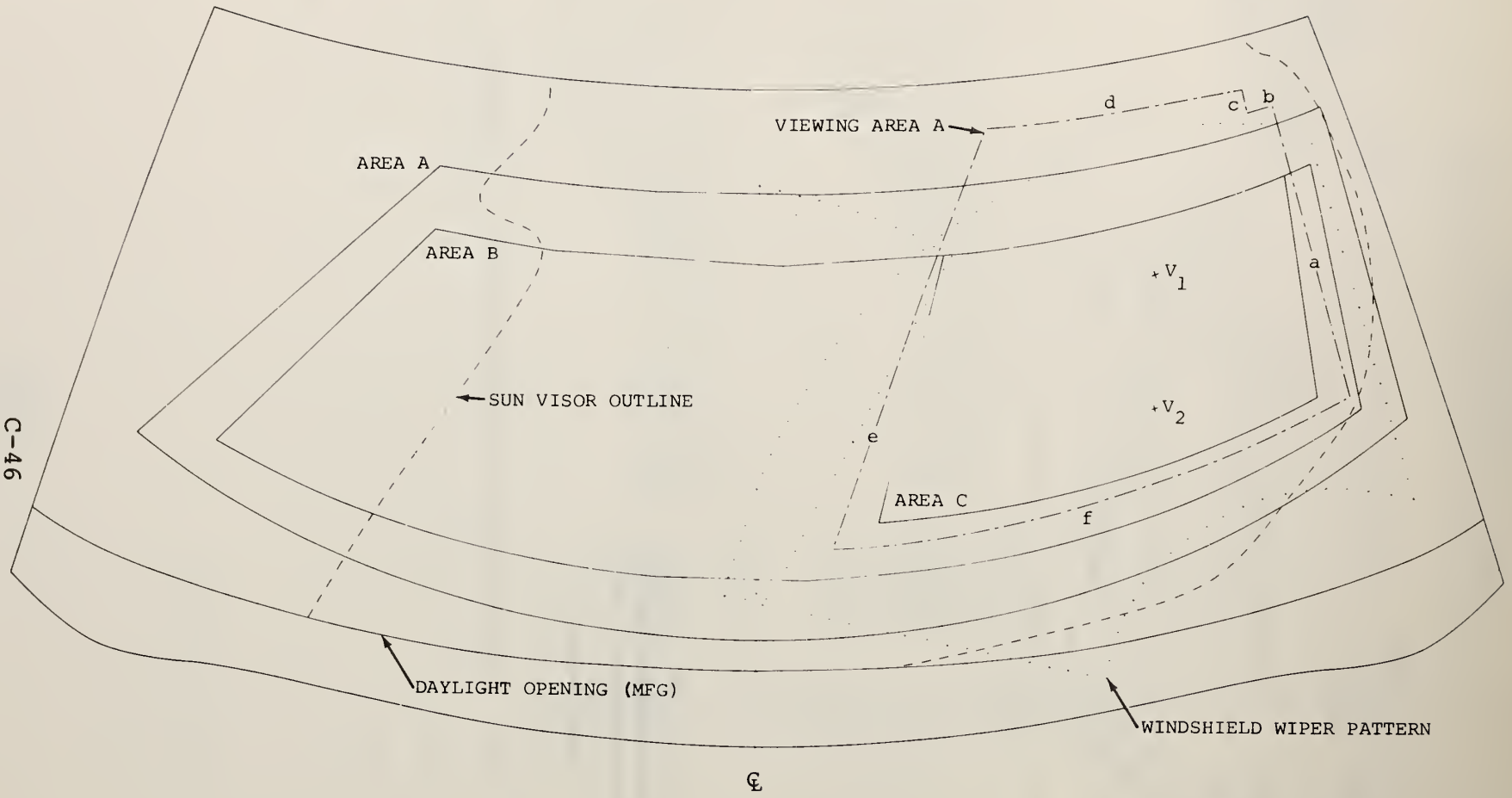
Zone: II

Obstruction	Right A Pillar		
Initial Sight to Outboard E - Rear Side	74°05'		
Adjusted Sight to Outboard E - Rear Side	30°00'		
Inboard E - Front Side	27°13'		
Angle to Bench Mark			
Obstruction Angle	2°47'		
Azimuth			

Explanations Pertinent to the Specific Measurements:



Plan View of Binocular Obstructions - Ford LTD.



Windshield Overlay Showing Relationship Between Critical Areas per FMVSS 104 and View Area A as Measured for This Vehicle - Ford LTD.

DATA SHEET 3

WINDSHIELD AREAS

VEHICLE:

MANUFACTURER Ford YEAR 1978

MODEL LTD BODY STYLE 4 Door Sedan

VIN 8J63H126545

VIEW AREA DIMENSIONAL MEASUREMENTS

Relative to Windshield Points

"A" Pillar to Side a 4.14

"A" Pillar to Side c 4.17

DLO Top of Windshield to Side d 2.34

DLO Bottom of Windshield to Side f 6.75

Relative to Critical A, B, C Areas

	A	B	C
Side a Leftward to	2.33	.42	-1.48
Side c Leftward to	3.36	2.34	1.03
Side e Rightward to	24.19	23.13	-.31
Side d Upward to	-2.38	-5.38	-5.38
Side f Downward to	4.02	1.49	-.76

Critical Areas (A, B, C) Relative to Windshield Points

	A	B	C
"A" Pillar to	2.03	3.92	5.59
DLO Top of Windshield to	4.72	7.70	7.70
DLO Bottom of Windshield to	2.72	5.26	7.76

Left Front Three-Quarter View - 1978 Ford LTD 4-Door Pillared Hardtop.

Right Rear Three-Quarter View - 1978 Ford LTD 4-Door Pillared Hardtop.

APPENDIX C4 - FORD LTD II

DATA SHEET NO. 1 - VEHICLE DATA

VEHICLE:

MANUFACTURER Ford YEAR 1978

MODEL LTD II BODY STYLE 2 Door Sedan

VIN 8A30F162916 ODOMETER 6662

BUILD DATE 12/77

SPECIAL OPTIONS

FRONT SEAT TYPE: SPECIFIED Flight Bench

TILT STEERING WHEEL? YES X NO

FRONT SEAT TRAVEL RANGE: SPECIFIED 5.50 in.

FRONT SEAT BACK ANGLE: SPECIFIED 26.5°

MEASURING POINT CORRECTIONS

	X (in.)	Z (in.)
P From Table 2	-1.26	--
P From Table 3	+0.68	-0.21
Total P	-.58	-0.21
V From Table 3	+0.68	-0.21

MANUFACTURER'S REFERENCE POINTS FOR SRP

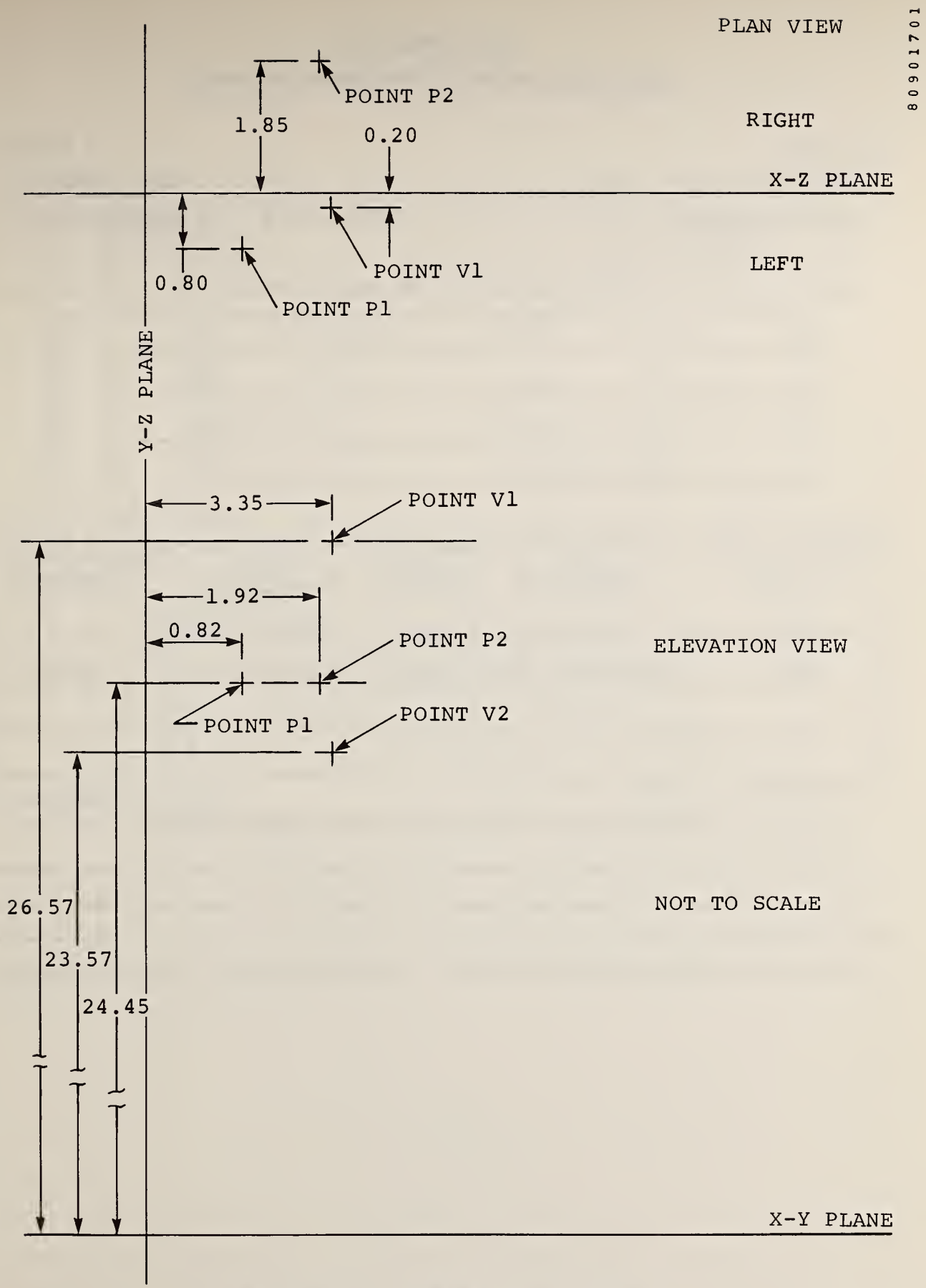
For X 42.85 in. to Zero X Plane L31

For Y -15.60 in. to Zero Y Plane W20

For Z 8.60 in. to Zero Z Plane H70

MANUFACTURER'S DIMENSIONS FOR VEHICLE ATTITUDE AND SRP LOCATION

	From Front Axle Centerline	From Vehicle Centerline	Height Above Ground at Design Load
Front Station	39.4 in.	--	11.36 in.
Rear Station	89.4 in.	--	10.95 in.
Master Control Notch	38.1 in.	--	6.93 in.
SRP	62.25 in.	-15.60 in.	18.55 in.
"R" Point	62.25 in.	-16.34 in.	--



Relationship of Reference Points -
1978 Ford LTD-II 2-Door Hardtop.

DATA SHEET 2

MONOCULAR OBSTRUCTION ANGLE FROM V_1

VEHICLE:

MANUFACTURER Ford YEAR 1978

MODEL LTD II BODY STYLE 2 Door Sedan

VIN 8A30F162916

LOCATION OF "V" POINT RELATIVE TO THE "R" Point

	V_1	V_2
X	3.35	3.35
Y	-0.20	-0.20
Z	26.57	23.57

OBSTRUCTIONS: Zone I

Elevation	Obstruction	Left Angle	Right Angle	Obstruction Angle
V_1	Left A Pillar	321°27'	330°27'	9°00'

Total 9°00'

Explanations Pertinent to the Specific Measurements:

DATA SHEET 2

MONOCULAR OBSTRUCTION ANGLE FROM V_1

VEHICLE:

MANUFACTURER Ford YEAR 1978

MODEL LTD II BODY STYLE 2 Door Sedan

VIN 8A30F162916

LOCATION OF "V" POINT RELATIVE TO THE "R" Point

	V_1	V_2
X	3.35	3.35
Y	-0.20	-0.20
Z	26.57	23.57

OBSTRUCTIONS: Zone II

Elevation	Obstruction	Left Angle	Right Angle	Obstruction Angle
V_1	Inside Rear View Mirror	26°24'	51°52'	25°28'
	Right A Pillar	67°45'	72°48'	5°03'

Total 30°31'

Explanations Pertinent to the Specific Measurements:

DATA SHEET 2

MONOCULAR OBSTRUCTION ANGLE FROM V_1

VEHICLE:

MANUFACTURER Ford YEAR 1978

MODEL LTD II BODY STYLE 2 Door Sedan

VIN 8A30F162916

LOCATION OF "V" POINT RELATIVE TO THE "R" Point

	V_1	V_2
X	3.35	3.35
Y	-0.20	-0.20
Z	26.57	23.57

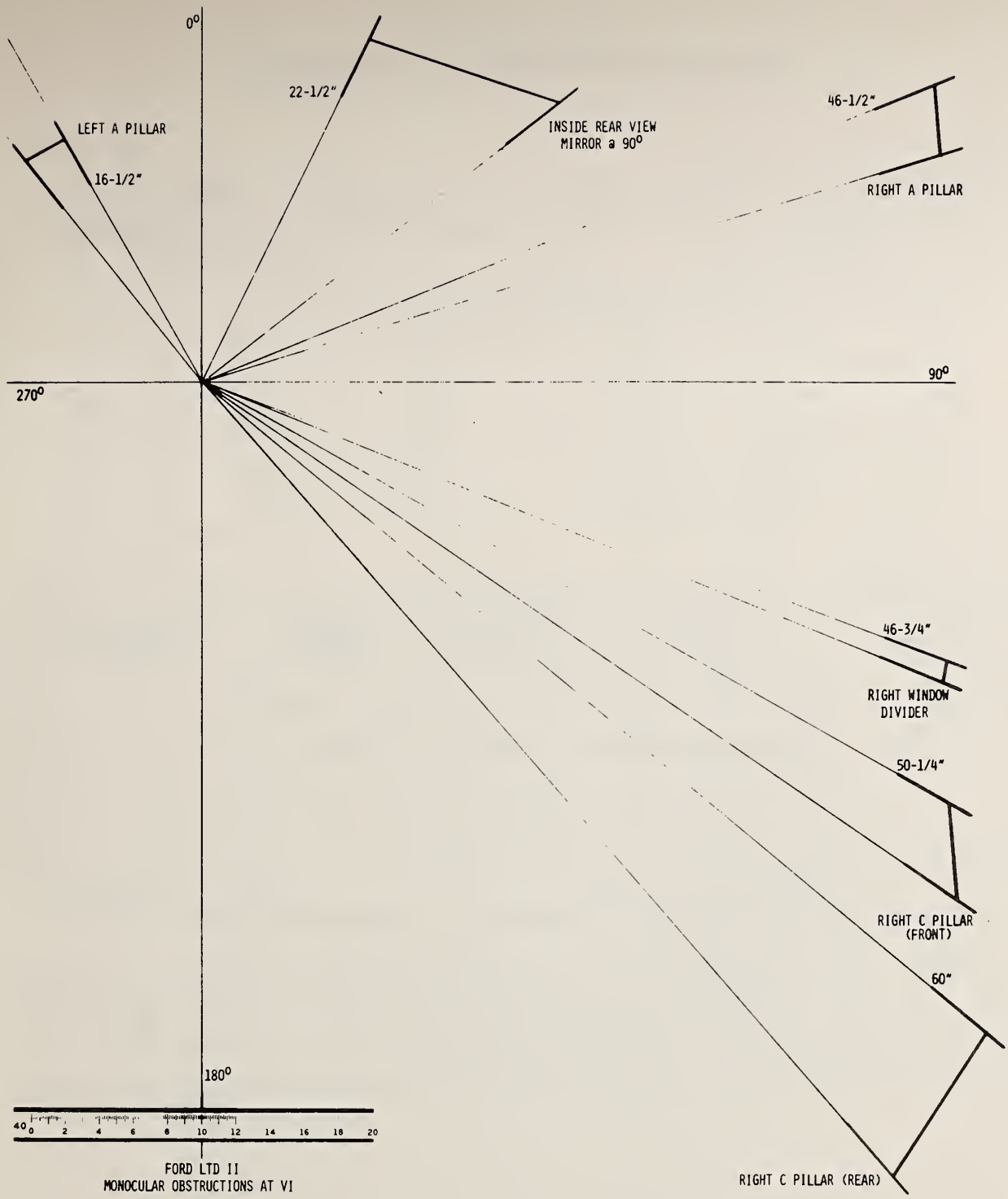
OBSTRUCTIONS: Zone IV

Elevation	Obstruction	Left Angle	Right Angle	Obstruction Angle
V_1	Right Rear Window Divider	110°38'	112°10'	1°32'
V_1	Right Forward C Pillar	119°22'	124°35'	5°13'
	Right Rear C Pillar	129°50'	139°00'	9°10'

Total 15°55'

Explanations Pertinent to the Specific Measurements:

NOTE: This model is also available with no rear side window. In that case, the "C" pillar obstruction would go from 119°22' to 139°00'=19°38' and the total Zone IV obstruction angle would be 21°10'.



Plan View of Monocular Obstructions at V_1 - Ford LTD II.

DATA SHEET 2

MONOCULAR OBSTRUCTION ANGLE FROM V_2

VEHICLE:

MANUFACTURER Ford YEAR 1978

MODEL LTD II BODY STYLE 2 Door Sedan

VIN 8A30F162916

LOCATION OF "V" POINT RELATIVE TO THE "R" Point

	V_1	V_2
X	3.35	3.35
Y	-0.20	-0.20
Z	26.57	23.57

OBSTRUCTIONS: Zone I

Elevation	Obstruction	Left Angle	Right Angle	Obstruction Angle
V_2	Left A Pillar	325°27'	332°42'	7°15'

Total 7°15'

Explanations Pertinent to the Specific Measurements:

DATA SHEET 2

MONOCULAR OBSTRUCTION ANGLE FROM V_2

VEHICLE:

MANUFACTURER Ford YEAR 1978

MODEL LTD II BODY STYLE 2 Door Sedan

VIN 8A30F162916

LOCATION OF "V" POINT RELATIVE TO THE "R" Point

	V_1	V_2
X	3.35	3.35
Y	-0.20	-0.20
Z	26.57	23.57

OBSTRUCTIONS: Zone II

Elevation	Obstruction	Left Angle	Right Angle	Obstruction Angle
V_2	Right A Pillar	64°35'	69°05'	4°30'

Total 4°30'

Explanations Pertinent to the Specific Measurements:

DATA SHEET 2

MONOCULAR OBSTRUCTION ANGLE FROM V_2

VEHICLE:

MANUFACTURER Ford YEAR 1978

MODEL LTD II BODY STYLE 2 Door Sedan

VIN 8A30F162916

LOCATION OF "V" POINT RELATIVE TO THE "R" Point

	V_1	V_2
X	3.35	3.35
Y	-0.20	-0.20
Z	26.57	23.57

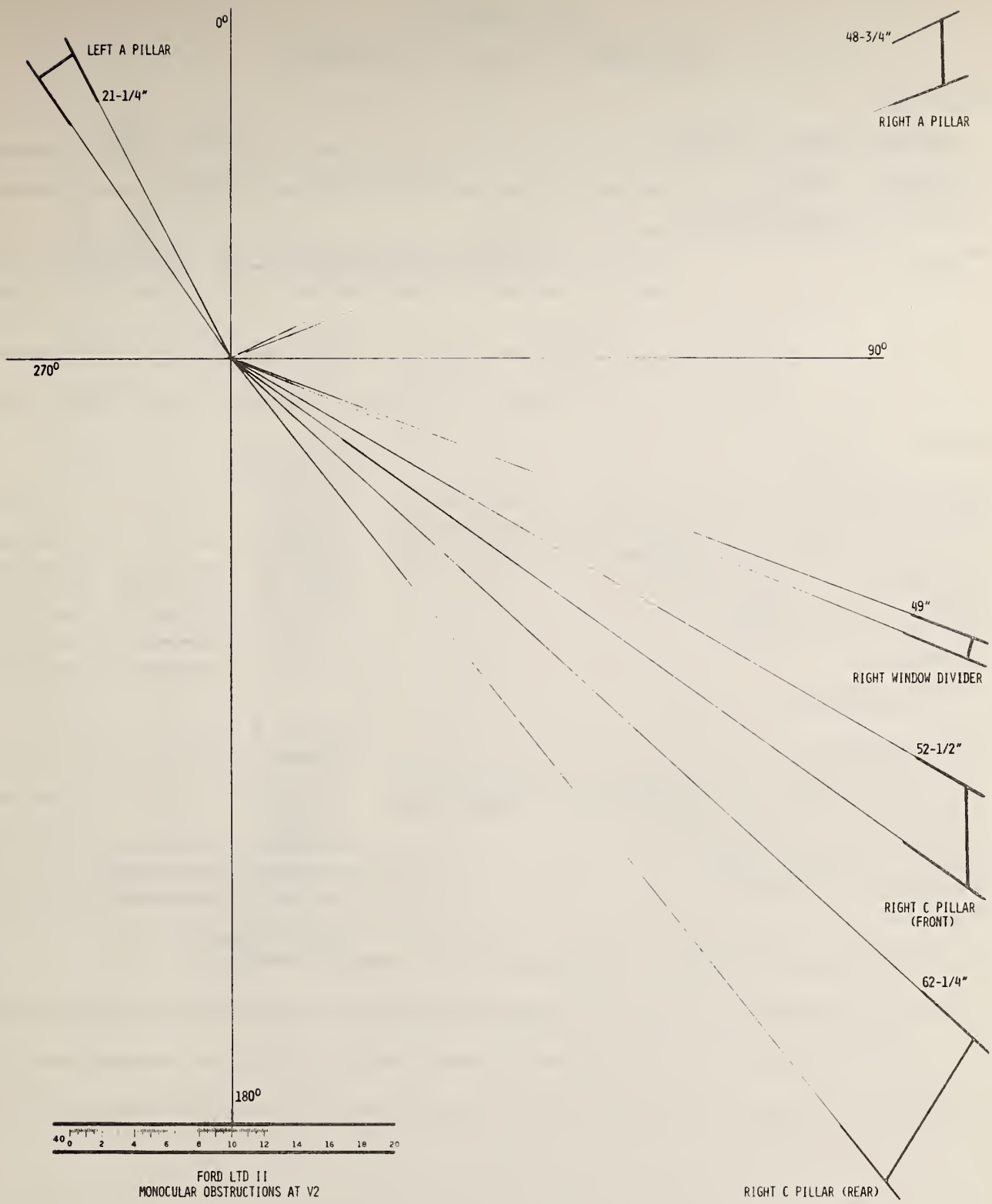
OBSTRUCTIONS: Zone IV

Elevation	Obstruction	Left Angle	Right Angle	Obstruction Angle
V_2	Right Rear Window Divider	110°32'	112°08'	1°36'
	Right Forward C Pillar	120°20'	125°36'	5°16'
	Right Rear C Pillar	132°40'	141°31'	8°51'

Total 15°43'

Explanations Pertinent to the Specific Measurements:

A body style is available which has no rear window. In this case, the "C" pillar obstruction would be from 120°20' to 141°31'=21°11' for a total Zone IV obstruction of 22°47'.



Plan View of Monocular Obstructions at V_2 - Ford LTD II.

DATA SHEET 4

BINOCULAR OBSTRUCTION ANGLES

VEHICLE:

MANUFACTURER Ford YEAR 1978

MODEL LTD II BODY STYLE 2 Door

VIN 8A30F162916

	Dimensions Relative to "R" Point		
	X	Y	Z
P_1	0.82	0.80	24.45
P_2	1.92	1.85	24.45

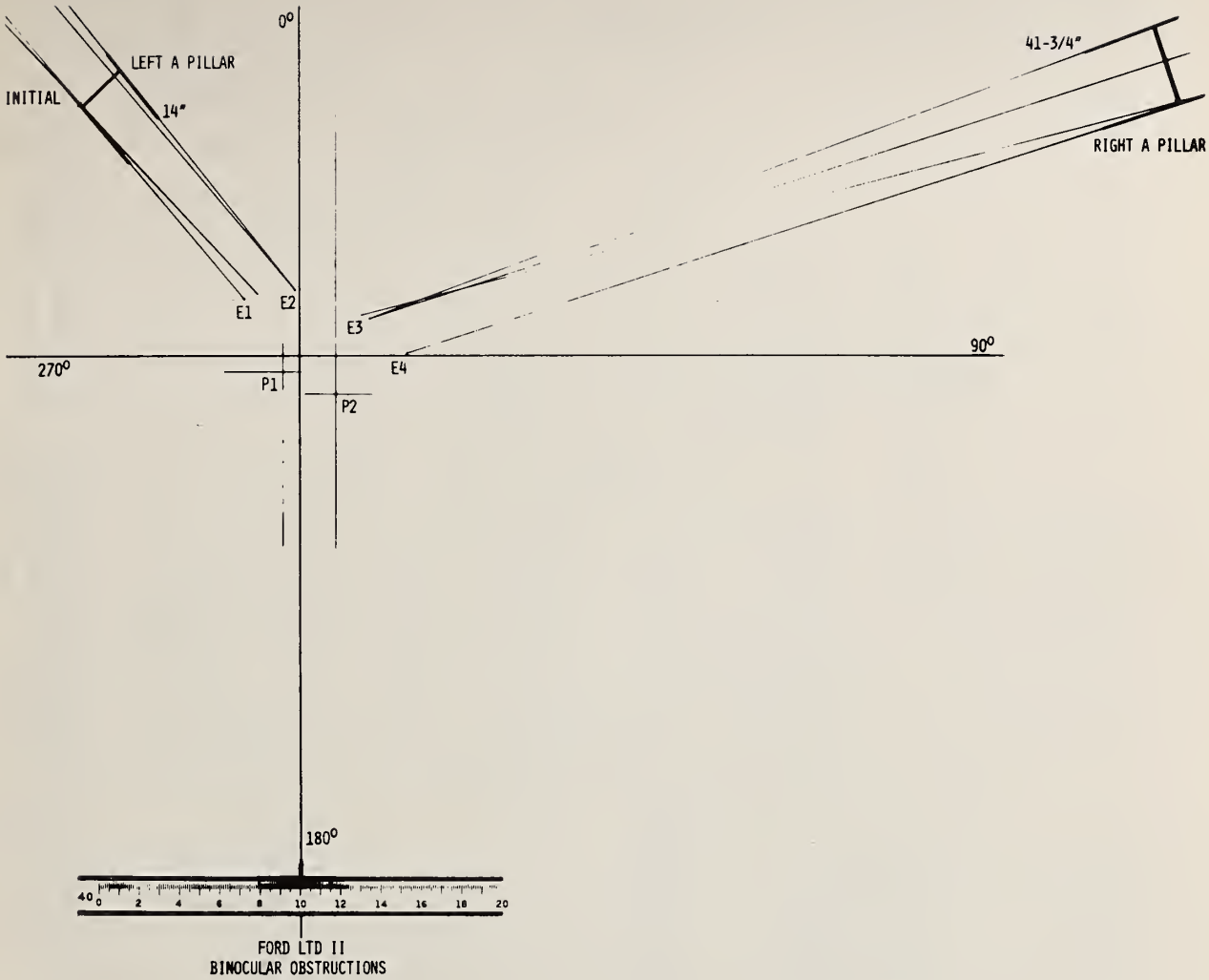
Zone: I

Obstruction	Left A Pillar		
Initial Sight to Outboard E - Rear Side	317°00'		
Adjusted Sight to Outboard E - Rear Side	330°00'		
Inboard E - Front Side	331°37'		
Angle to Bench Mark			
Obstruction Angle	1°37'		
Azimuth			

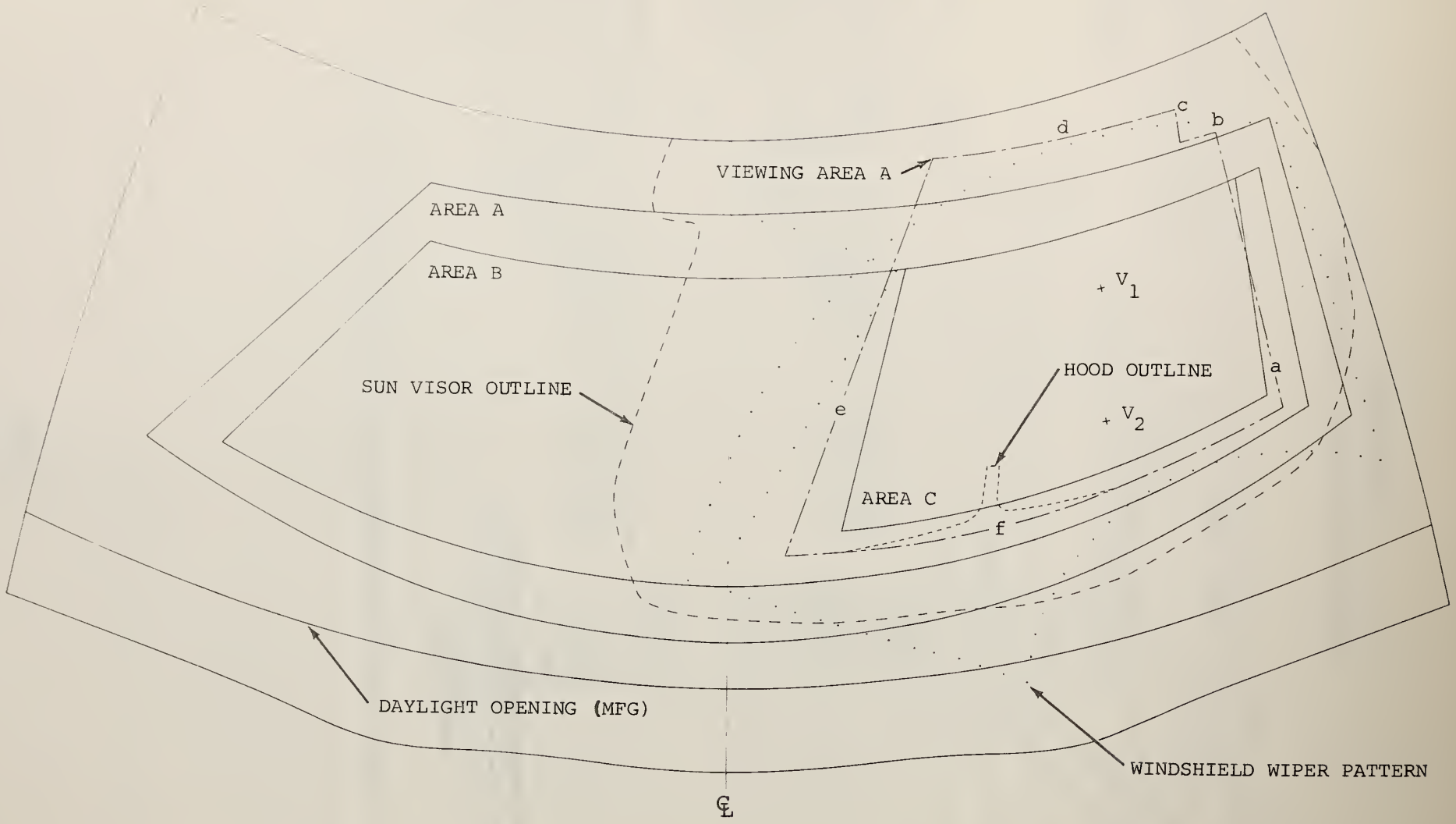
Zone: II

Obstruction	Right A Pillar		
Initial Sight to Outboard E - Rear Side	75°34'		
Adjusted Sight to Outboard E - Rear Side	30°00'		
Inboard E - Front Side	27°25'		
Angle to Bench Mark			
Obstruction Angle	2°35'		
Azimuth			

Explanations Pertinent to the Specific Measurements:



Plan View of Binocular Obstructions - Ford LTD II.



Windshield Overlay Showing Relationship Between Critical Areas per FMVSS 104 and View Area A as Measured for This Vehicle - Ford LTD II.

DATA SHEET 3

WINDSHIELD AREAS

VEHICLE:

MANUFACTURER Ford YEAR 1978

MODEL LTD II BODY STYLE 2 Door Sedan

VIN 8A30F162916

VIEW AREA DIMENSIONAL MEASUREMENTS

Relative to Windshield Points

"A" Pillar to Side a 5.22

"A" Pillar to Side c 5.47

DLO Top of Windshield to Side d 1.91

DLO Bottom of Windshield to Side f 6.44

Relative to Critical A, B, C Areas

	A	B	C
Side a Leftward to	2.94	1.17	-0.58
Side c Leftward to	4.00	3.16	2.22
Side e Rightward to	21.78	20.75	-0.66
Side d Upward to	-1.90	-4.53	-4.53
Side f Downward to	3.34	0.99	-1.03

Critical Areas (A, B, C) Relative to Windshield Points

	A	B	C
"A" Pillar to	2.28	4.05	5.75
DLO Top of Windshield to	3.81	6.44	6.44
DLO Bottom of Windshield to	3.10	5.45	7.47

Left Front Three-Quarter View - 1978 Ford LTD-II 2-Door Hardtop.

Right Rear Three-Quarter View - 1978 Ford LTD-II 2-Door Hardtop.

APPENDIX C5 - FORD THUNDERBIRD

DATA SHEET NO. 1 - VEHICLE DATA

VEHICLE:

MANUFACTURER Ford YEAR 1978

MODEL Thunderbird BODY STYLE 2 Door Sedan

VIN 8J87H148707 ODOMETER 6072

BUILD DATE

SPECIAL OPTIONS

FRONT SEAT TYPE: SPECIFIED

TILT STEERING WHEEL? YES ____ NO X

FRONT SEAT TRAVEL RANGE: SPECIFIED 5.6 in.

FRONT SEAT BACK ANGLE: SPECIFIED 26.5°

MEASURING POINT CORRECTIONS

	X (in.)	Z (in.)
P From Table 2	-1.26	--
P From Table 3	+0.68	-0.21
Total P	- .58	-0.21
V From Table 3	+0.68	-0.21

MANUFACTURER'S REFERENCE POINTS FOR SRP

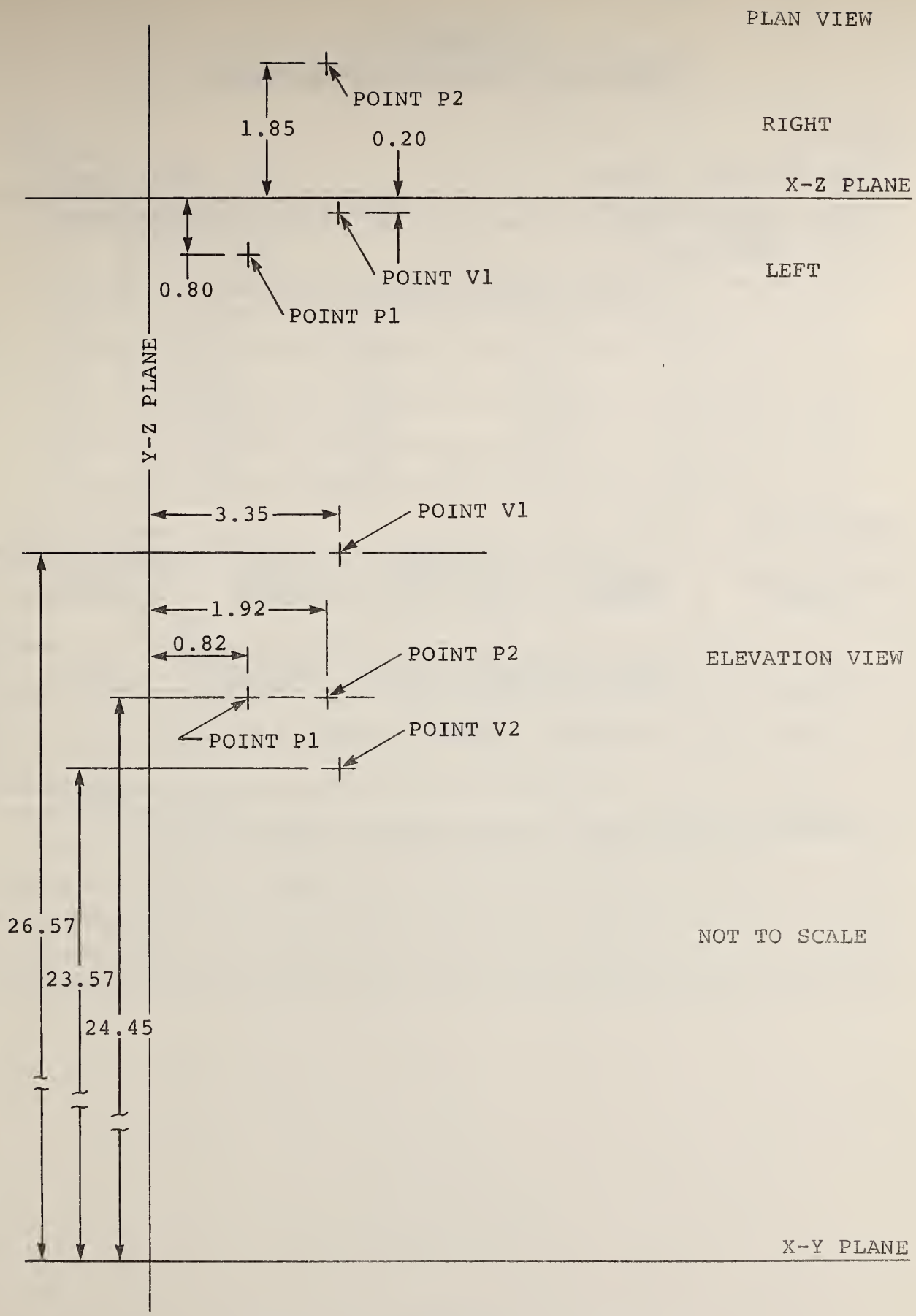
For X 42.85 in. to Zero X Plane L31

For Y -15.60 in. to Zero Y Plane W20

For Z 8.60 in. to Zero Z Plane H70

MANUFACTURER'S DIMENSIONS FOR VEHICLE ATTITUDE AND SRP LOCATION

	From Front Axle Centerline	From Vehicle Centerline	Height Above Ground at Design Load
Front Station	39.4 in.		11.59 in.
Rear Station	89.4 in.		11.09 in.
Master Control Notch	38.15 in.	29.86 in.	7.16 in.
SRP	62.25 in.	15.60 in.	18.74 in.
"R" Point	62.25 in.	16.34 in.	18.74 in.



Relationship of Reference Points -
1978 Ford Thunderbird 2-Door Coupe.

DATA SHEET 2

MONOCULAR OBSTRUCTION ANGLE FROM V_1

VEHICLE:

MANUFACTURER Ford YEAR 1978

MODEL Thunderbird BODY STYLE 2 Door Sedan

VIN 8J87H148707

LOCATION OF "V" POINT RELATIVE TO THE "R" Point

	V_1	V_2
X	3.35	3.35
Y	-0.20	-0.20
Z	26.57	23.57

OBSTRUCTIONS: Zone I

Elevation	Obstruction	Left Angle	Right Angle	Obstruction Angle
V_1	Left A Pillar	322°16'	331°29'	9°13'

Total 9°13'

Explanations Pertinent to the Specific Measurements:

DATA SHEET 2

MONOCULAR OBSTRUCTION ANGLE FROM V_1

VEHICLE:

MANUFACTURER Ford YEAR 1978

MODEL Thunderbird BODY STYLE 2 Door Sedan

VIN 8J87H148707

LOCATION OF "V" POINT RELATIVE TO THE "R" Point

	V_1	V_2
X	3.35	3.35
Y	-0.20	-0.20
Z	26.57	23.57

OBSTRUCTIONS: Zone II

Elevation	Obstruction	Left Angle	Right Angle	Obstruction Angle
V_1	Rear View Mirror	28°10'	52°45'	24°35'
	Right A Pillar	68°08'	73°02'	4°54'

Total 29°29'

Explanations Pertinent to the Specific Measurements:

DATA SHEET 2

MONOCULAR OBSTRUCTION ANGLE FROM V_1

VEHICLE:

MANUFACTURER Ford YEAR 1978

MODEL Thunderbird BODY STYLE 2 Door Sedan

VIN 8J87H148707

LOCATION OF "V" POINT RELATIVE TO THE "R" Point

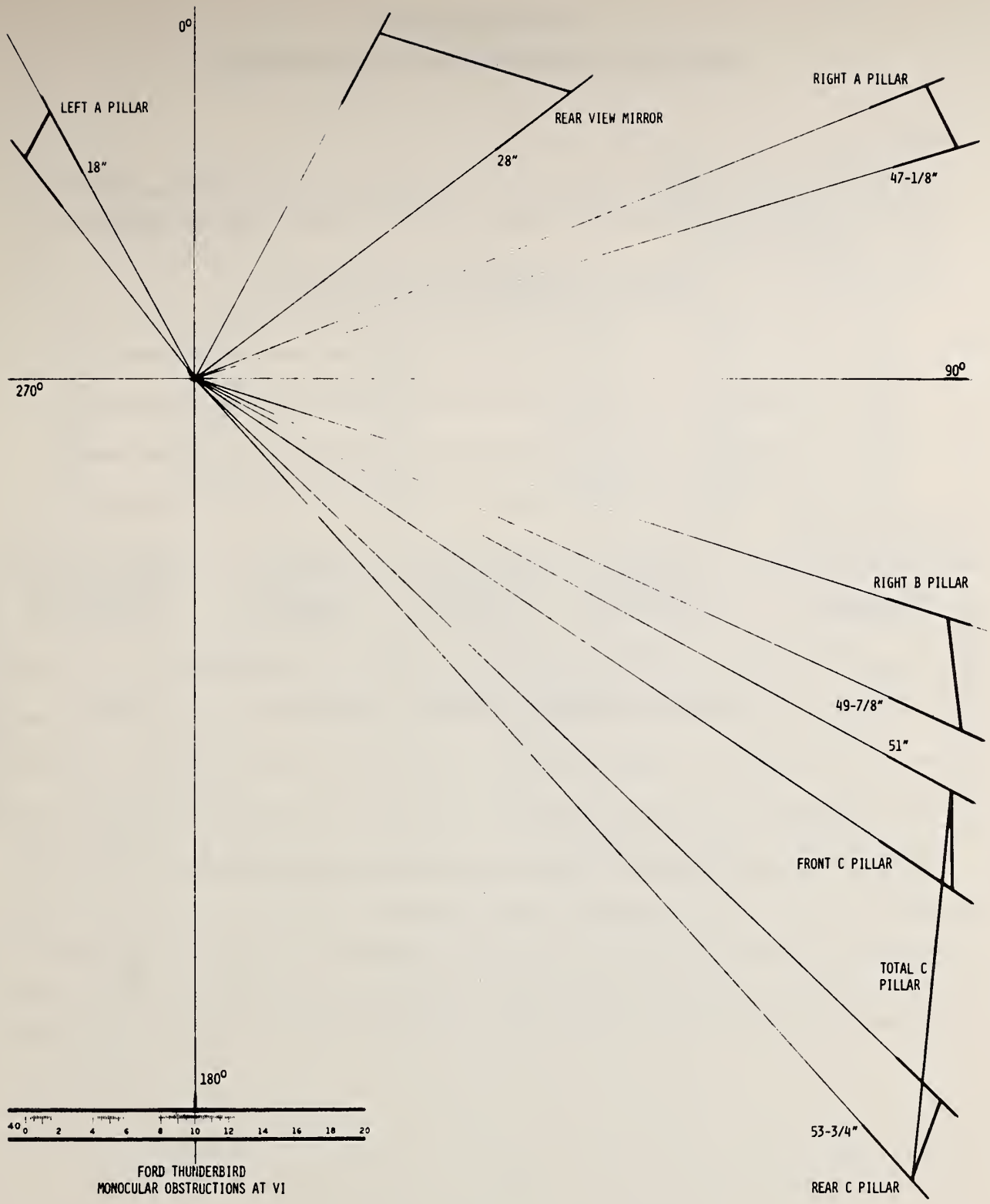
	V_1	V_2
X	3.35	3.35
Y	-0.20	-0.20
Z	26.57	23.57

OBSTRUCTIONS: Zone IV

Elevation	Obstruction	Left Angle	Right Angle	Obstruction Angle
V_1	Right B Pillar	107°41'	114°59'	7°18'
	Right C Pillar	118°44'	138°18'	19°34'

Total 26°52'

Explanations Pertinent to the Specific Measurements:



Plan View of Monocular Obstructions at V_1 - Ford Thunderbird.

DATA SHEET 2

MONOCULAR OBSTRUCTION ANGLE FROM V_2

VEHICLE:

MANUFACTURER Ford YEAR 1978

MODEL Thunderbird BODY STYLE 2 Door Sedan

VIN 8J87H148707

LOCATION OF "V" POINT RELATIVE TO THE "R" Point

	V_1	V_2
X	3.35	3.35
Y	-0.20	-0.20
Z	26.57	23.57

OBSTRUCTIONS: Zone I

Elevation	Obstruction	Left Angle	Right Angle	Obstruction Angle
V_2	Left A Pillar	325°31'	332°51'	7°20'

Total 7°20'

Explanations Pertinent to the Specific Measurements:

DATA SHEET 2

MONOCULAR OBSTRUCTION ANGLE FROM V_2

VEHICLE:

MANUFACTURER Ford YEAR 1978

MODEL Thunderbird BODY STYLE 2 Door Sedan

VIN 8J87H148707

LOCATION OF "V" POINT RELATIVE TO THE "R" Point

	V_1	V_2
X	3.35	3.35
Y	-0.20	-0.20
Z	26.57	23.57

OBSTRUCTIONS: Zone II

Elevation	Obstruction	Left Angle	Right Angle	Obstruction Angle
V_2	Right A Pillar	64°25'	68°52'	4°27'

Total 4°27'

Explanations Pertinent to the Specific Measurements:

DATA SHEET 2

MONOCULAR OBSTRUCTION ANGLE FROM V_2

VEHICLE:

MANUFACTURER Ford YEAR 1978

MODEL Thunderbird BODY STYLE 2 Door Sedan

VIN 8J87H148707

LOCATION OF "V" POINT RELATIVE TO THE "R" Point

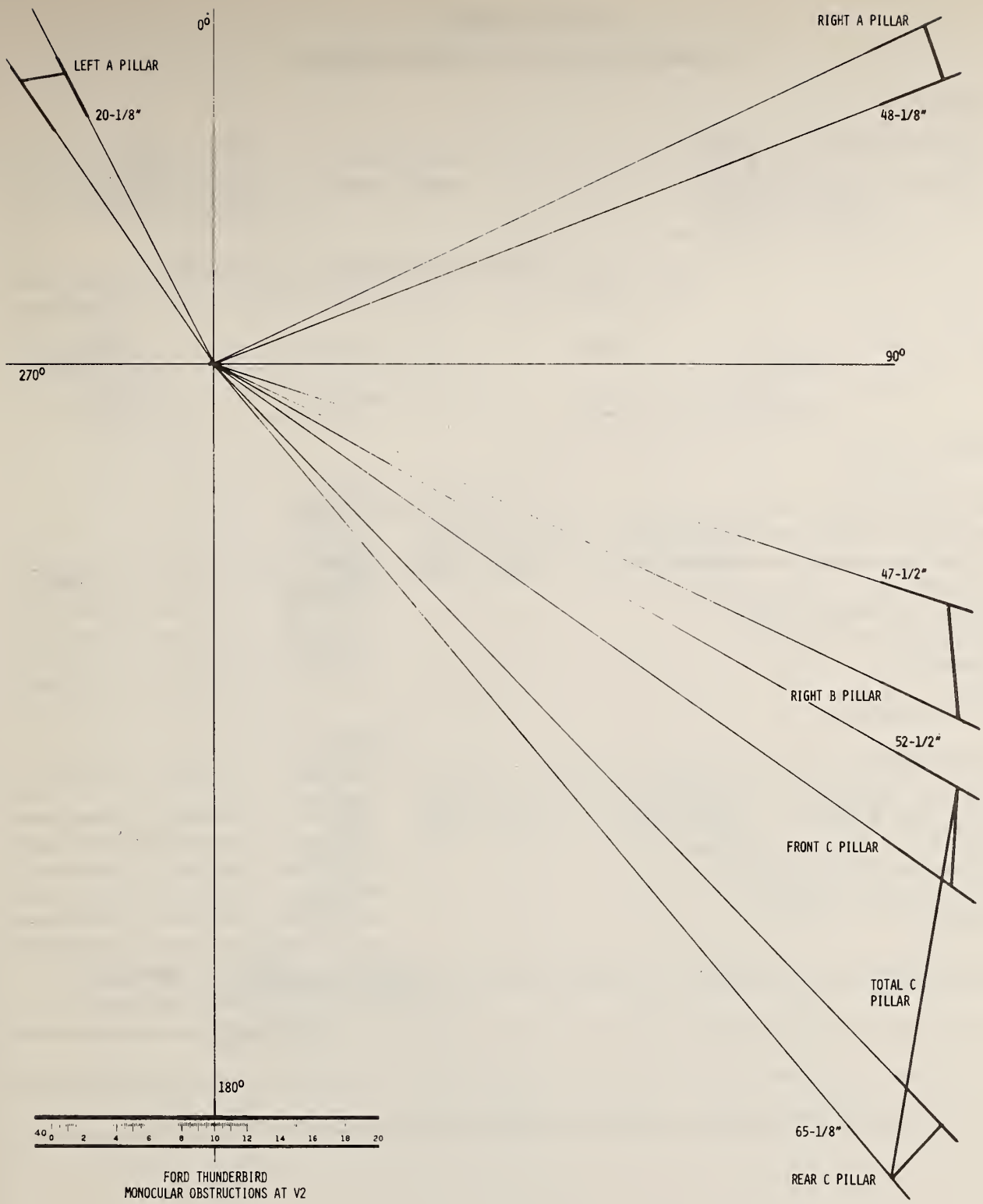
	V_1	V_2
X	3.35	3.35
Y	-0.20	-0.20
Z	26.57	23.57

OBSTRUCTIONS: Zone IV

Elevation	Obstruction	Left Angle	Right Angle	Obstruction Angle
V_2	Right B Pillar	108°09'	115°32'	7°23'
V_2	Right C Pillar	119°31'	140°02'	20°31'

Total 27°54'

Explanations Pertinent to the Specific Measurements:



Plan View of Monocular Obstructions at V_2 - Ford Thunderbird.

DATA SHEET 4

BINOCULAR OBSTRUCTION ANGLES

VEHICLE:

MANUFACTURER Ford YEAR 1978

MODEL Thunderbird BODY STYLE 2 Door Sedan

VIN 8J87H148707

	Dimensions Relative to SRP		
	X	Y	Z
P_1	0.82	-0.80	24.45
P_2	1.92	+1.85	24.45

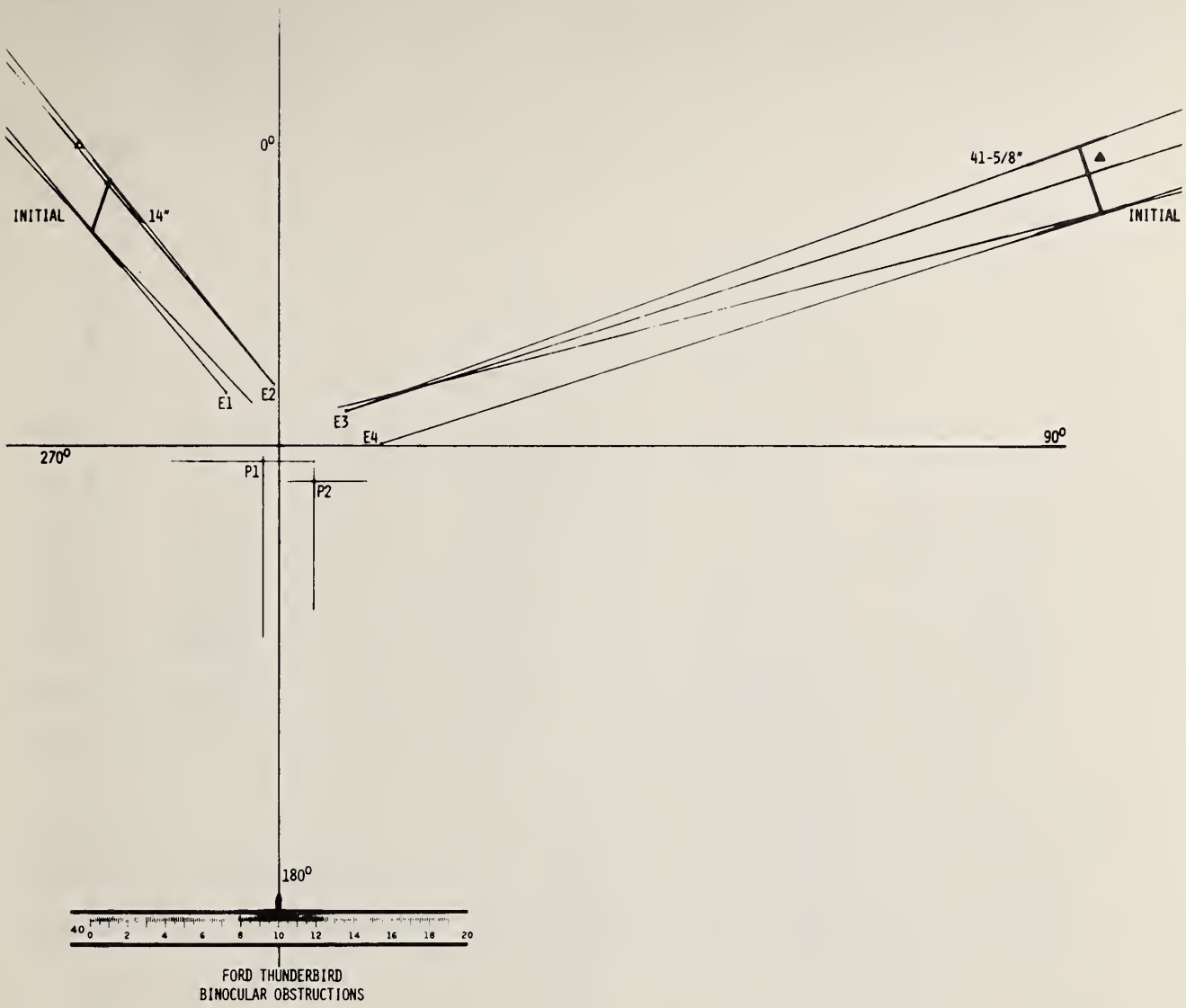
Zone: I

Obstruction	Left A Pillar		
Initial Sight to Outboard E - Rear Side	317°08'		
Adjusted Sight to Outboard E - Rear Side	330°		
Inboard E - Front Side	331°42'		
Angle to Bench Mark			
Obstruction Angle	1°42'		
Azimuth			

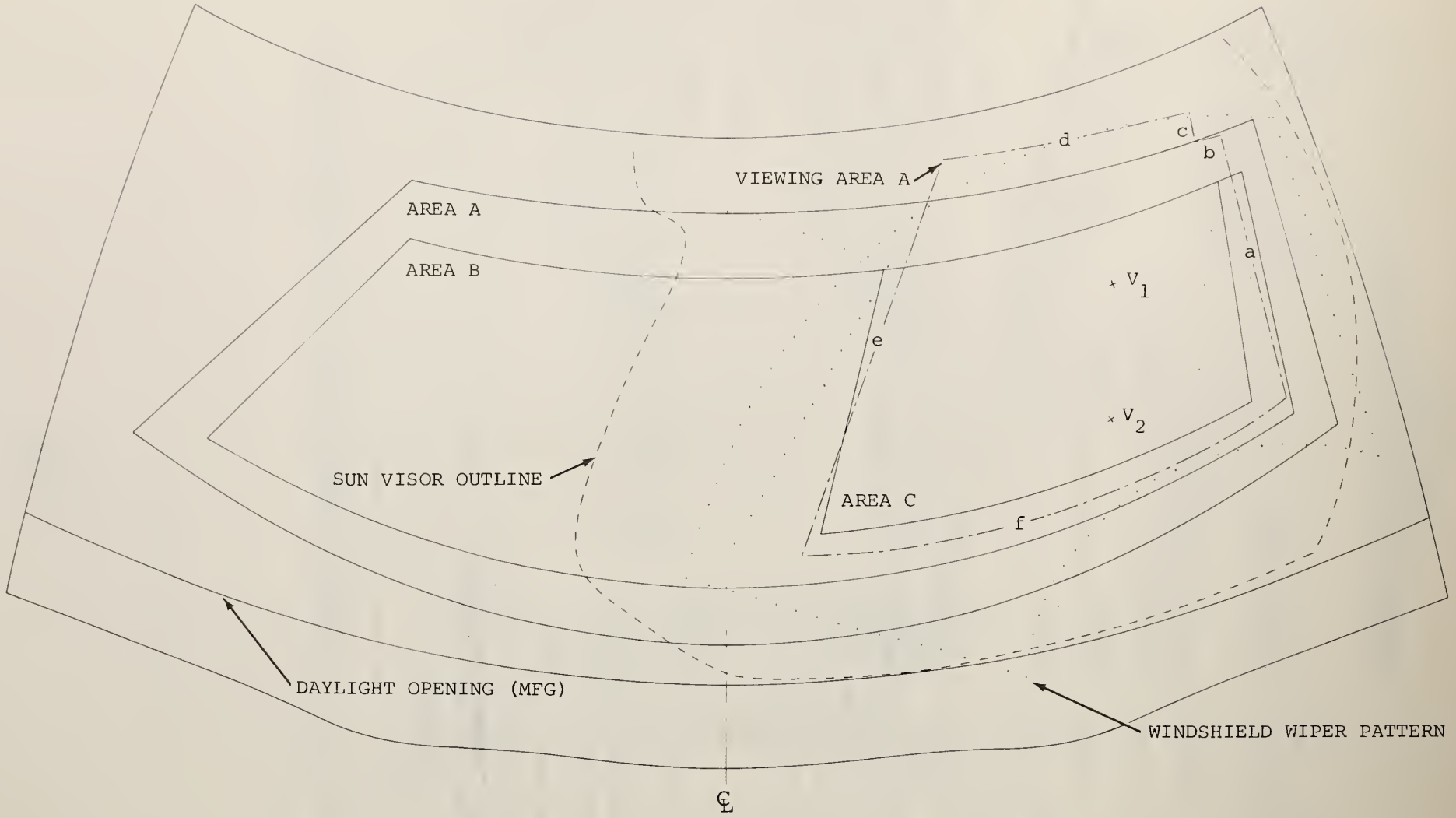
Zone: II

Obstruction	Right A Pillar		
Initial Sight to Outboard E - Rear Side	75°10'		
Adjusted Sight to Outboard E - Rear Side	30°		
Inboard E - Front Side	27°41'		
Angle to Bench Mark			
Obstruction Angle	2°19'		
Azimuth			

Explanations Pertinent to the Specific Measurements:



Plan View of Binocular Obstructions - Ford Thunderbird.



Windshield Overlay Showing Relationship Between Critical Areas per FMVSS 104 and View Area A as Measured for This Vehicle - Ford Thunderbird.

DATA SHEET 3

WINDSHIELD AREAS

VEHICLE:

MANUFACTURER Ford YEAR 1978

MODEL Thunderbird BODY STYLE 2 Door Sedan

VIN 8J87H148707

VIEW AREA DIMENSIONAL MEASUREMENTS

Relative to Windshield Points

"A" Pillar to Side a 5.06

"A" Pillar to Side c 4.84

DLO Top of Windshield to Side d 2.31

DLO Bottom of Windshield to Side f 6.17

Relative to Critical A, B, C Areas

	A	B	C
Side a Leftward to	2.03	0.21	-1.58
Side c Leftward to	2.68	1.73	0.79
Side e Rightward to	23.24	21.38	0.91
Side d Upward to	-1.66	-4.28	-4.28
Side f Downward to	3.22	0.88	-1.16

Critical Areas (A, B, C) Relative to Windshield Points

	A	B	C
"A" Pillar to	3.03	4.85	6.46
DLO Top of Windshield to	3.97	6.59	6.59
DLO Bottom of Windshield to	2.95	5.29	7.33

Left Front Three-Quarter View - 1978 Ford Thunderbird 2-Door Coupe.

Right Rear Three-Quarter View - 1978 Ford Thunderbird 2-Door Coupe.

APPENDIX D

VISIBILITY MEASUREMENTS ON CHRYSLER CORPORATION VEHICLES

APPENDIX D1 - CHRYSLER CORDOBA

DATA SHEET NO. 1 - VEHICLE DATA

VEHICLE:

MANUFACTURER Chrysler Corporation YEAR 1978

MODEL Chrysler Cordoba BODY STYLE Specialty H.T.

VIN SS22N8R226430 ODOMETER

BUILD DATE 4/78

SPECIAL OPTIONS

FRONT SEAT TYPE: SPECIFIED Manual Bench

TILT STEERING WHEEL? YES ____ NO ____

FRONT SEAT TRAVEL RANGE: SPECIFIED 5.9 in.

FRONT SEAT BACK ANGLE: SPECIFIED 26.0°

MEASURING POINT CORRECTIONS

	X (in.)	Z (in.)
P From Table 2	-1.64	--
P From Table 3	0.34	-0.10
Total P	-1.30	-0.10
V From Table 3	0.34	-0.10

MANUFACTURER'S REFERENCE POINTS FOR SRP

For X 46.5 in. to Zero X Plane L31

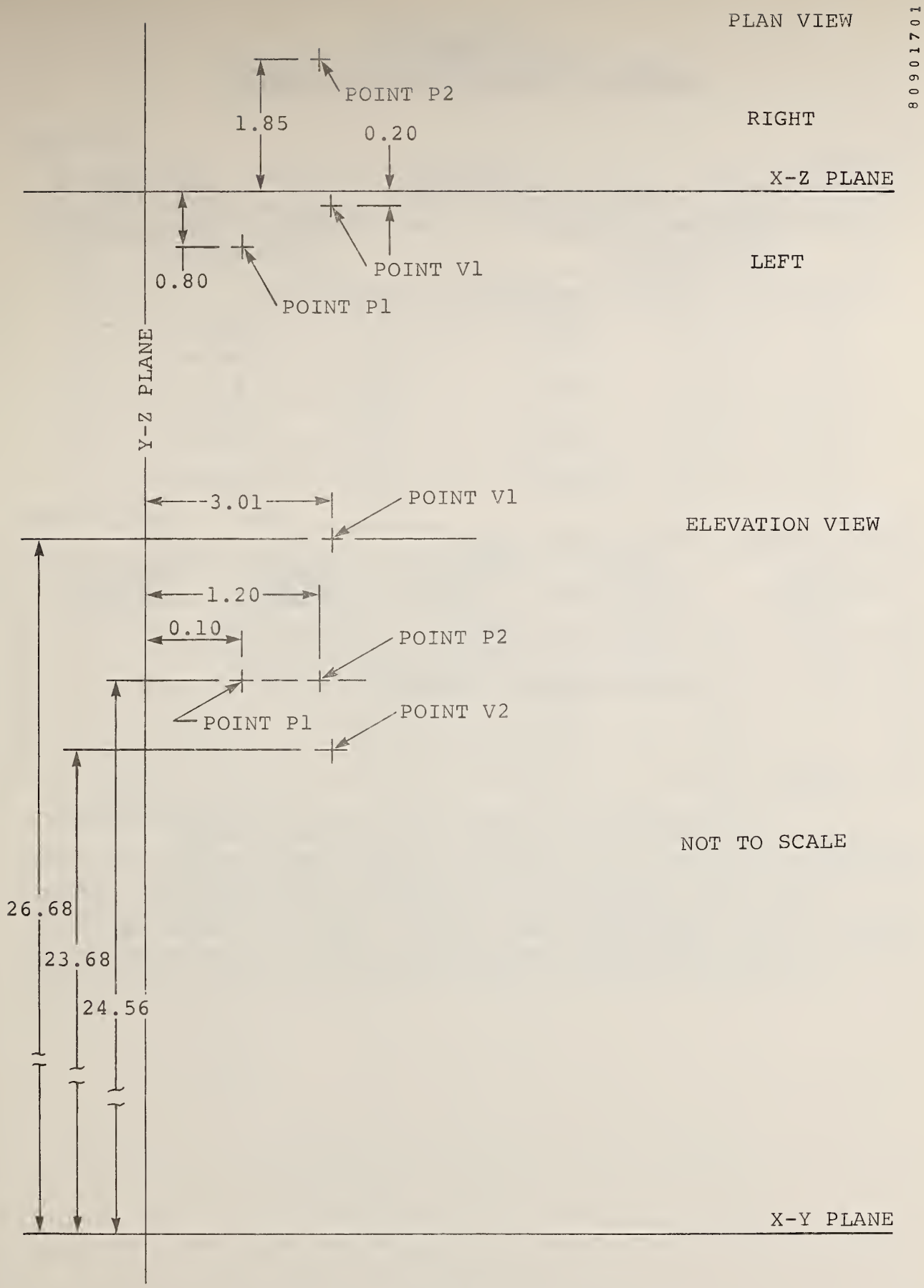
For Y -15.0 in. to Zero Y Plane W20

For Z 5.9 in. to Zero Z Plane H70

MANUFACTURER'S DIMENSIONS FOR VEHICLE ATTITUDE

	From Front Axle Centerline	From Vehicle Centerline	Height Above Ground (Zero Z-plane Level)*
Front Station	41.6 in.	±18.75 in.	5.74
Rear Station	86.2 in.	±18.80 in.	5.63
SRP	63.0 in.	-15.0 in.	18.39
"R" Point	63.0 in.	-16.09 in.	18.39

*NOTE: With full passenger load (no cargo) Zero Z-plane has an elevation above ground of 13.2 inches at front axle and 11.7 inches at rear axle. Station elevations are then 5.97 (front) and 5.36 (rear). "R" point elevation is 18.39 inches.



Relationship of Reference Points -
1978 Chrysler Cordoba 2-Door Specialty Hardtop.

DATA SHEET 2

MONOCULAR OBSTRUCTION ANGLE FROM V_1

VEHICLE:

MANUFACTURER Chrysler Corporation YEAR 1978

MODEL Chrysler Cordoba BODY STYLE Specialty H.T.

VIN SS22N8R226430

LOCATION OF "V" POINT RELATIVE TO THE "R" Point

	V_1	V_2
X	3.01	3.01
Y	-0.20	-0.20
Z	26.68	23.68

OBSTRUCTIONS: Zone I

Elevation	Obstruction	Left Angle	Right Angle	Obstruction Angle
V1	Left A Pillar	323°05'	331°52'	8°47'

Total 8°47'

Explanations Pertinent to the Specific Measurements:

DATA SHEET 2

MONOCULAR OBSTRUCTION ANGLE FROM V_1

VEHICLE:

MANUFACTURER Chrysler Corporation YEAR 1978

MODEL Chrysler Cordoba BODY STYLE Specialty H.T.

VIN SS22N8R226430

LOCATION OF "V" POINT RELATIVE TO THE "R" Point

	V_1	V_2
X	3.01	3.01
Y	-0.20	-0.20
Z	26.68	23.68

OBSTRUCTIONS: Zone II

Elevation	Obstruction	Left Angle	Right Angle	Obstruction Angle
V1	Part of Rear View Mirror*	39°05'	45°50'	6°45'
	Right A Pillar	66°28'	71°55'	5°27'

Total 12°12'

Explanations Pertinent to the Specific Measurements:

*Only the bottom edge of mirror entered the V1 plane as indicated above. Maximum width of mirror is as follows: Left Side (.75 in. above V1 plane) - 27°02', and Right Side (.71 in. above V1 plane) - 53°45' for a net obstruction angle of 26°43'.

DATA SHEET 2

MONOCULAR OBSTRUCTION ANGLE FROM V_1

VEHICLE:

MANUFACTURER Chrysler Corporation YEAR 1978

MODEL Chrysler Cordoba BODY STYLE Specialty H.T.

VIN SS22N8R226430

LOCATION OF "V" POINT RELATIVE TO THE "R" Point

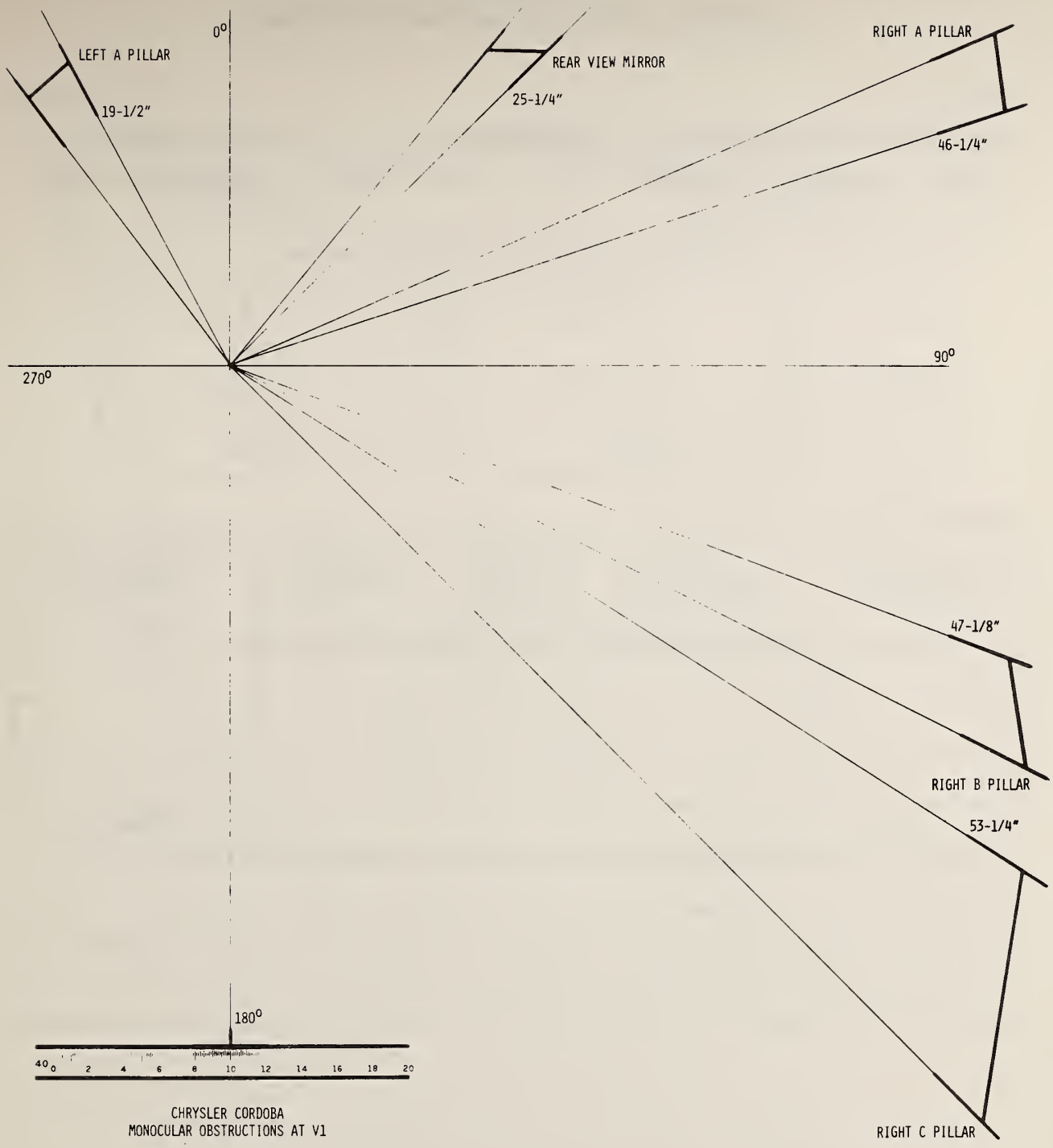
	V_1	V_2
X	3.01	3.01
Y	-0.20	-0.20
Z	26.68	23.68

OBSTRUCTIONS: Zone IV

Elevation	Obstruction	Left Angle	Right Angle	Obstruction Angle
V_1	Right B Pillar	110°41'	116°54'	6°13'
	Right C Pillar	122°25'	135°08'	12°43'

Total 18°56'

Explanations Pertinent to the Specific Measurements:



Plan View of Monocular Obstructions at V_1 - Chrysler Cordoba.

DATA SHEET 2

MONOCULAR OBSTRUCTION ANGLE FROM V_2

VEHICLE:

MANUFACTURER Chrysler Corporation YEAR 1978

MODEL Chrysler Cordoba BODY STYLE Specialty H.T.

VIN SS22N8R226430

LOCATION OF "V" POINT RELATIVE TO THE "R" Point

	V_1	V_2
X	3.01	3.01
Y	-0.20	-0.20
Z	26.68	23.68

OBSTRUCTIONS: Zone I

Elevation	Obstruction	Left Angle	Right Angle	Obstruction Angle
V_2	Left A Pillar	326°21'	333°20'	6°59'

Total 6°59'

Explanations Pertinent to the Specific Measurements:

DATA SHEET 2

MONOCULAR OBSTRUCTION ANGLE FROM V_2

VEHICLE:

MANUFACTURER Chrysler Corporation YEAR 1978

MODEL Chrysler Cordoba BODY STYLE Specialty H.T.

VIN SS22N8R226430

LOCATION OF "V" POINT RELATIVE TO THE "R" Point

	V_1	V_2
X	3.01	3.01
Y	-0.20	-0.20
Z	26.68	23.68

OBSTRUCTIONS: Zone II

Elevation	Obstruction	Left Angle	Right Angle	Obstruction Angle
V_2	Right A Pillar	62°22'	66°59'	4°37'

Total 4°37'

Explanations Pertinent to the Specific Measurements:

DATA SHEET 2

MONOCULAR OBSTRUCTION ANGLE FROM V_2

VEHICLE:

MANUFACTURER Chrysler Corporation YEAR 1978

MODEL Chrysler Cordoba BODY STYLE Specialty H.T.

VIN SS22N8R226430

LOCATION OF "V" POINT RELATIVE TO THE "R" Point

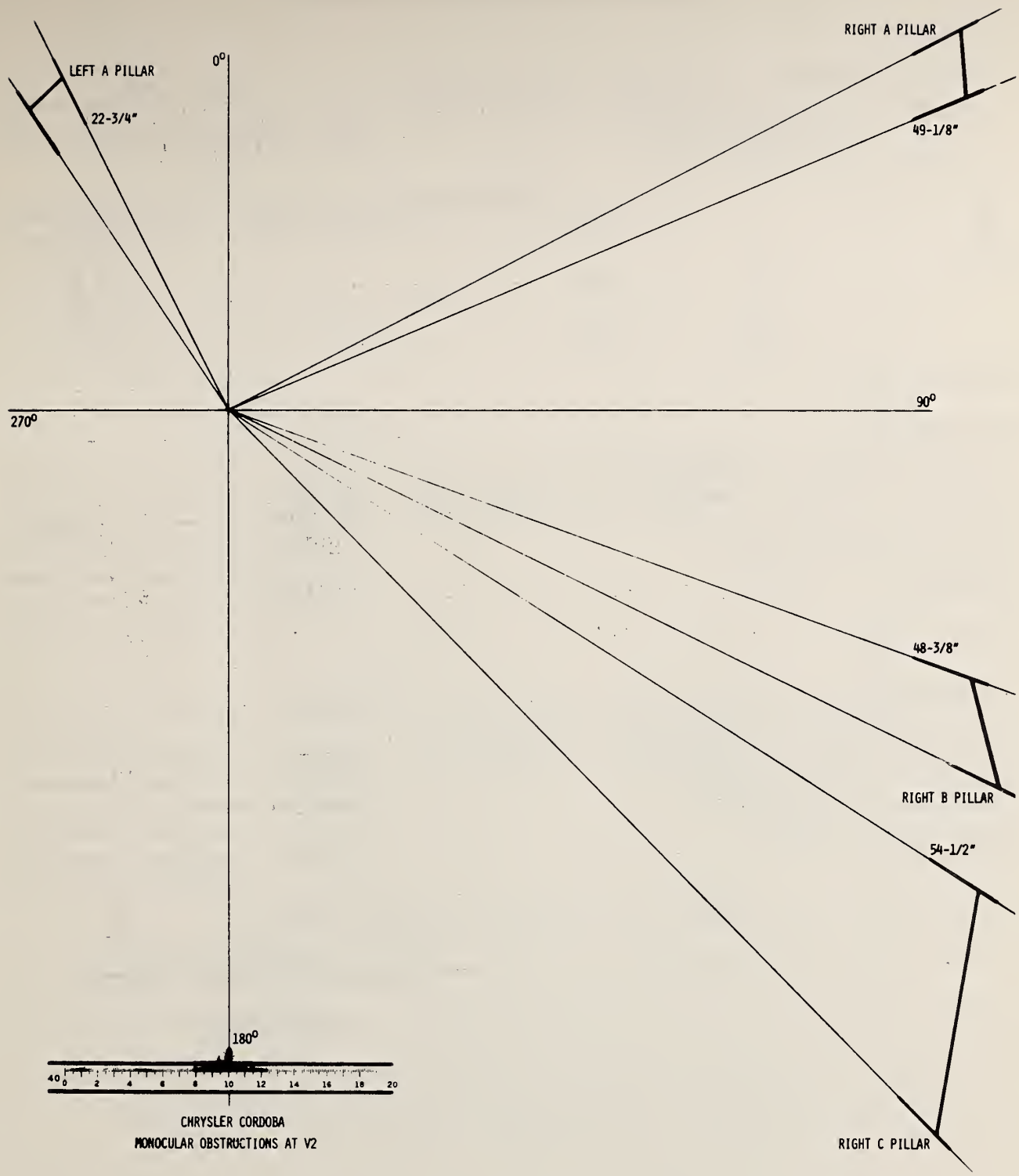
	V_1	V_2
X	3.01	3.01
Y	-0.20	-0.20
Z	26.68	23.68

OBSTRUCTIONS: Zone IV

Elevation	Obstruction	Left Angle	Right Angle	Obstruction Angle
V_2	Right B Pillar	109°54'	116°08'	6°14'
	Right C Pillar	122°32'	135°41'	13°09'

Total 19°23'

Explanations Pertinent to the Specific Measurements:



Plan View of Monocular Obstructions at V_2 - Chrysler Cordoba.

DATA SHEET 4

BINOCULAR OBSTRUCTION ANGLES

VEHICLE:

MANUFACTURER Chrysler Corporation YEAR 1978

MODEL Chrysler Cordoba BODY STYLE Specialty H.T.

VIN SS22N8R226430

	Dimensions Relative to "R" Point		
	X	Y	Z
P_1	0.10	-0.80	24.56
P_2	1.20	+1.85	24.56

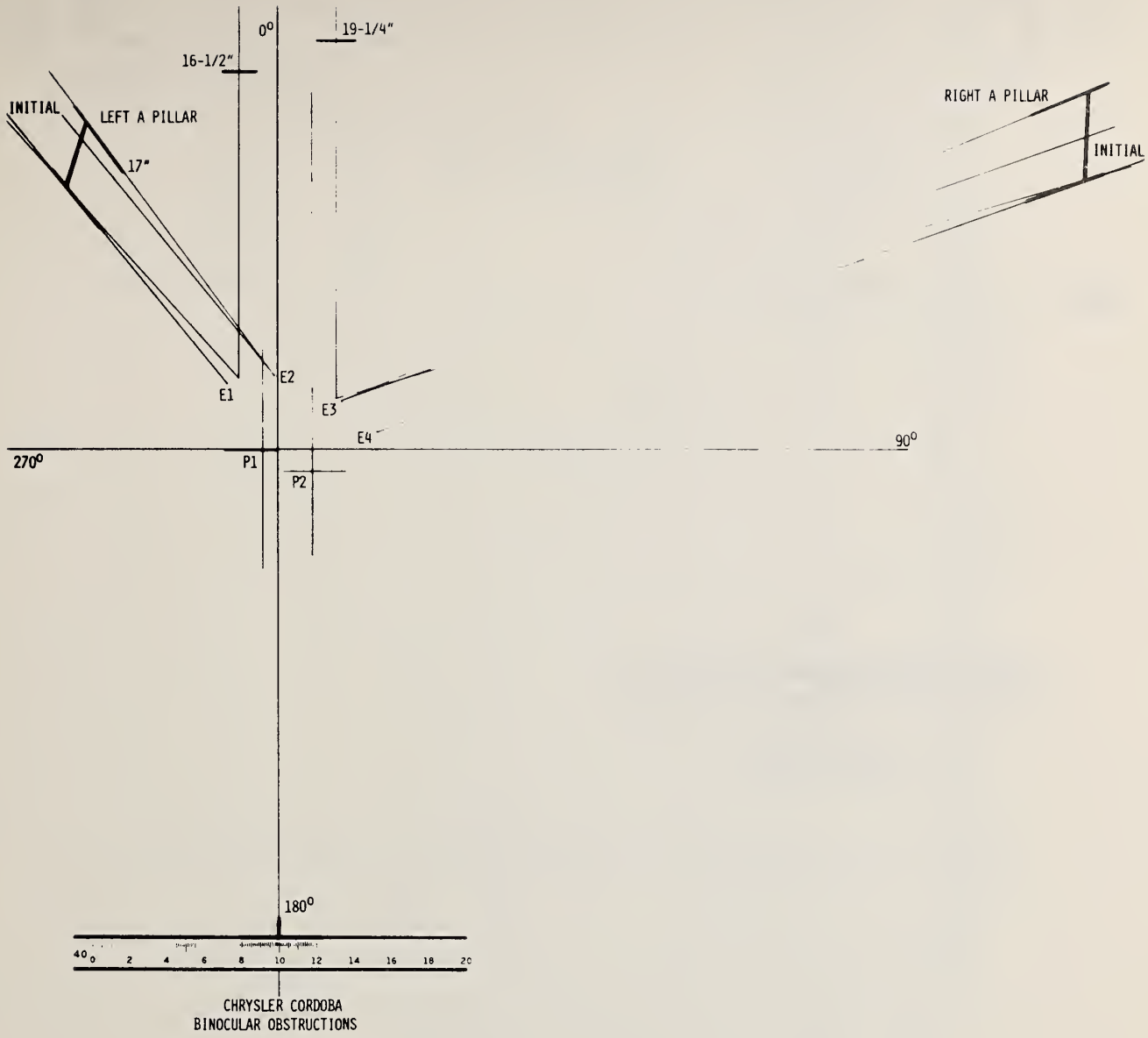
Zone: I

Obstruction	Left A Pillar		
Initial Sight to Outboard E - Rear Side	317°45'		
Adjusted Sight to Outboard E - Rear Side	330°00'		
Inboard E - Front Side	332°43'		
Angle to Bench Mark			
Obstruction Angle	2°43'		
Azimuth			

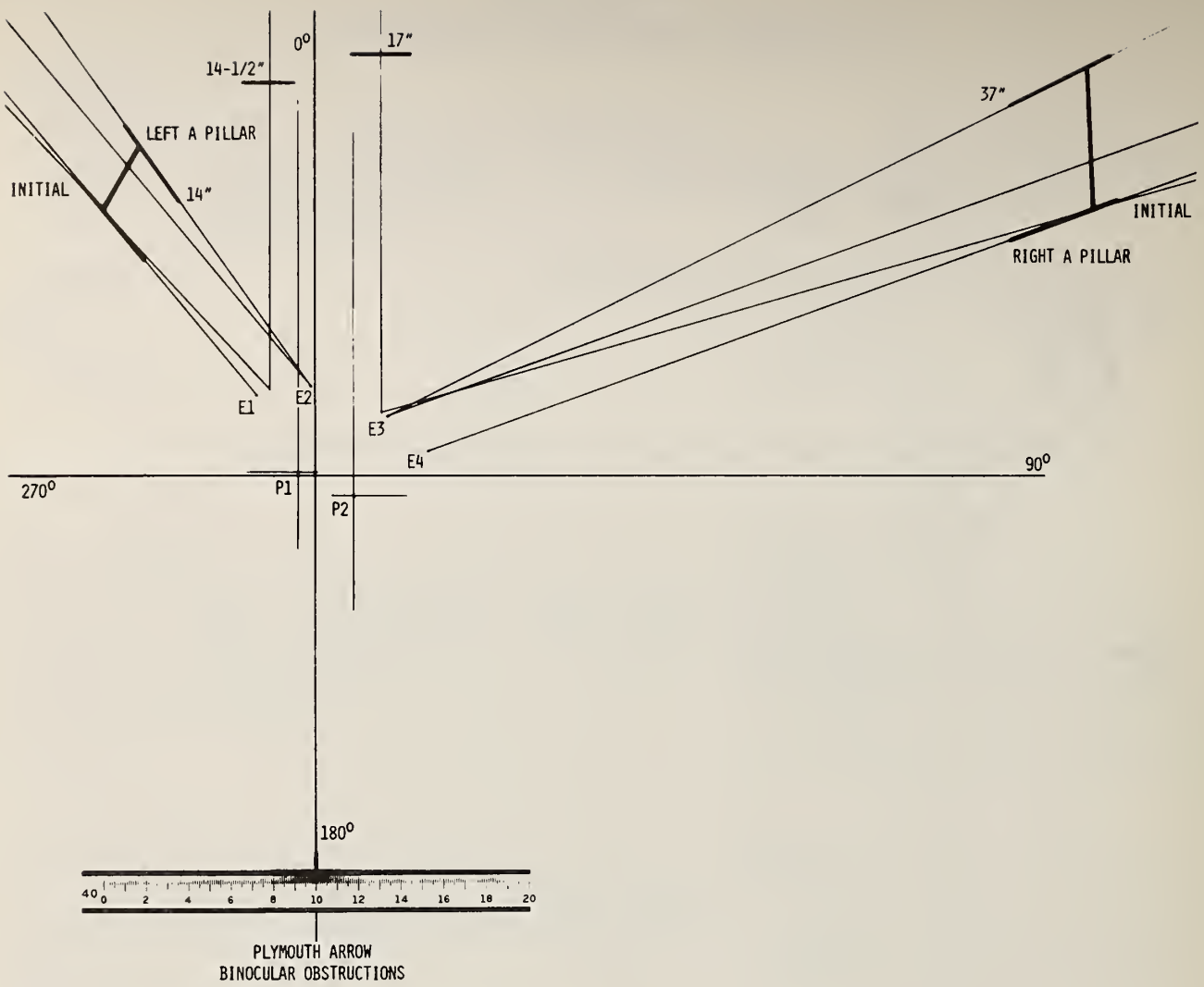
Zone: II

Obstruction	Right A Pillar		
Initial Sight to Outboard E - Rear Side	73°34'		
Adjusted Sight to Outboard E - Rear Side	30°00'		
Inboard E - Front Side	27°19'		
Angle to Bench Mark			
Obstruction Angle	2°41'		
Azimuth			

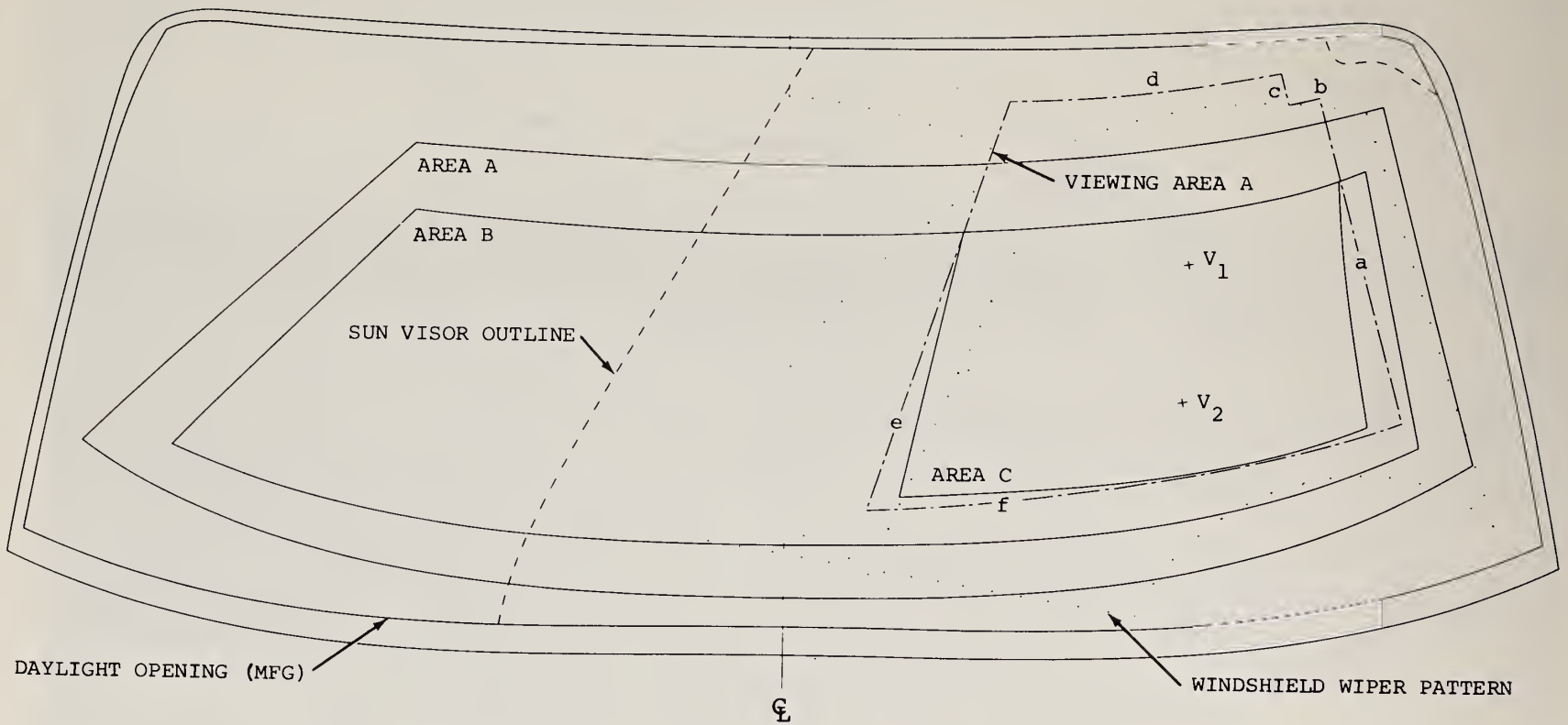
Explanations Pertinent to the Specific Measurements:



Plan View of Binocular Obstructions - Chrysler Cordoba.



Plan View of Binocular Obstructions - Plymouth Arrow.



Windshield Overlay Showing Relationship Between Critical Areas per FMVSS 104 and View Area A as Measured for This Vehicle - Chrysler Cordoba.

DATA SHEET 3

WINDSHIELD AREAS

VEHICLE:

MANUFACTURER Chrysler Corporation YEAR 1978

MODEL Chrysler Cordoba BODY STYLE Specialty H.T.

VIN SS22N8R226430

VIEW AREA DIMENSIONAL MEASUREMENTS

Relative to Windshield Points

"A" Pillar to Side a 4.87

"A" Pillar to Side c 5.71

DLO Top of Windshield to Side d 1.95

DLO Bottom of Windshield to Side f 6.02

Relative to Critical A, B, C Areas

	A	B	C
Side a Leftward to	2.45	0.50	-1.44
Side c Leftward to	3.77	2.68	1.76
Side e Rightward to	23.82	22.81	0.02
Side d Upward to	-2.42	-5.25	-5.25
Side f Downward to	4.04	1.82	-0.16

Critical Areas (A, B, C) Relative to Windshield Points

	A	B	C
"A" Pillar to	2.42	4.37	6.36
DLO Top of Windshield to	4.37	7.20	7.20
DLO Bottom of Windshield to	1.98	4.20	6.18

Left Front Three-Quarter View - 1978 Chrysler Cordoba 2-Door Specialty Hardtop.

Right Rear Three-Quarter View - 1978 Chrysler Cordoba 2-Door Specialty Hardtop.

APPENDIX D1 - DODGE DIPLOMAT

DATA SHEET NO. 1 - VEHICLE DATA

VEHICLE:

MANUFACTURER Chrysler Corporation YEAR 1978

MODEL Dodge Diplomat BODY STYLE 4 Door

VIN GH41D86243883 ODOMETER 4902

BUILD DATE 3/78

SPECIAL OPTIONS

FRONT SEAT TYPE: SPECIFIED Bench

TILT STEERING WHEEL: YES ____ NO X

FRONT SEAT TRAVEL RANGE: SPECIFIED 5.9 in.

FRONT SEAT BACK ANGLE: SPECIFIED 26.0°

MEASURING POINT CORRECTIONS

	X (in.)	Z (in.)
P From Table 2	-1.64	--
P From Table 3	+0.34	-0.10
Total P	-1.30	-0.10
V From Table 3	+0.34	-0.10

MANUFACTURER'S REFERENCE POINTS FOR SRP

For X 44.1 in. to Zero X Plane L31

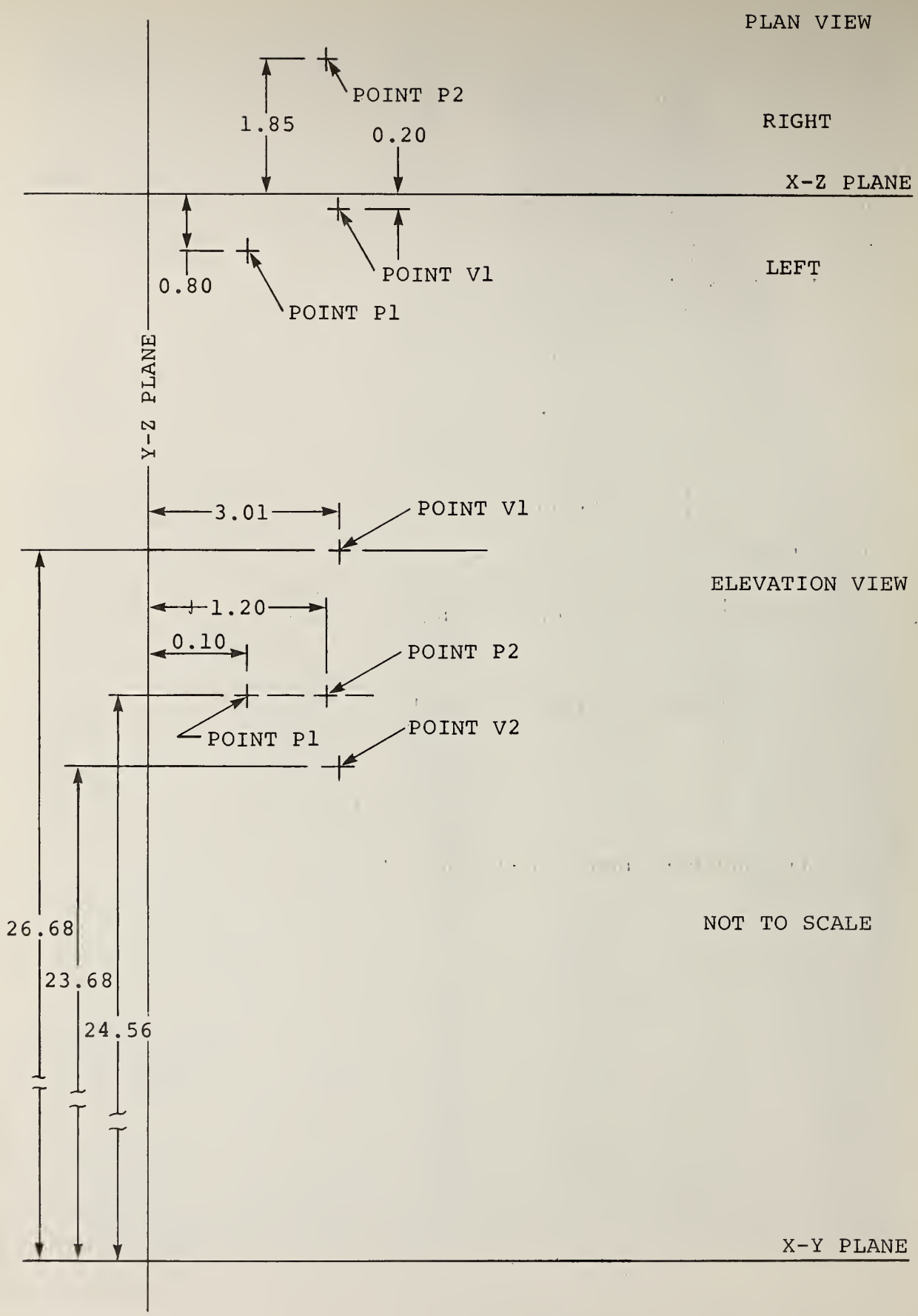
For Y -14.0 in. to Zero Y Plane W20

For Z 6.49 in. to Zero Z Plane H70

MANUFACTURER'S DIMENSIONS FOR VEHICLE ATTITUDE*

	From Front Axle Centerline	From Vehicle Centerline	Height Above Ground
Front Station	36.5 in.	±16.25 in.	7.04 in.
Rear Station	87.0 in.	±17.60 in.	5.75 in.
SRP	59.4 in.	-14.0 in.	19.49 in.
"R" Point	59.4 in.	-14.57 in.	19.49 in.

*At design load without luggage.



Relationship of Reference Points -
1978 Dodge Diplomat 4-Door Sedan.

DATA SHEET 2

MONOCULAR OBSTRUCTION ANGLE FROM V_1

VEHICLE:

MANUFACTURER Chrysler Corporation YEAR 1978

MODEL Dodge Diplomat BODY STYLE 4 Door

VIN GH41D86243883

LOCATION OF "V" POINT RELATIVE TO THE "R" Point

	V_1	V_2
X	3.01	3.01
Y	-0.20	-0.20
Z	26.68	23.68

OBSTRUCTIONS: Zone I

Elevation	Obstruction	Left Angle	Right Angle	Obstruction Angle
V_1	Left A Pillar	323°43'	332°03'	8°20'

Total 8°20'

Explanations Pertinent to the Specific Measurements:

DATA SHEET 2

MONOCULAR OBSTRUCTION ANGLE FROM V_1

VEHICLE:

MANUFACTURER Chrysler Corporation YEAR 1978

MODEL Dodge Diplomat BODY STYLE 4 Door

VIN GH41D86243883

LOCATION OF "V" POINT RELATIVE TO THE "R" Point

	V_1	V_2
X	3.01	3.01
Y	-0.20	-0.20
Z	26.68	23.68

OBSTRUCTIONS: Zone II

Elevation	Obstruction	Left Angle	Right Angle	Obstruction Angle
V_1	Right A Pillar	62°10'	67°23'	5°13'

Total 5°13'

Explanations Pertinent to the Specific Measurements:

DATA SHEET 2

MONOCULAR OBSTRUCTION ANGLE FROM V_1

VEHICLE:

MANUFACTURER Chrysler Corporation YEAR 1978

MODEL Dodge Diplomat BODY STYLE 4 Door

VIN GH41D86243883

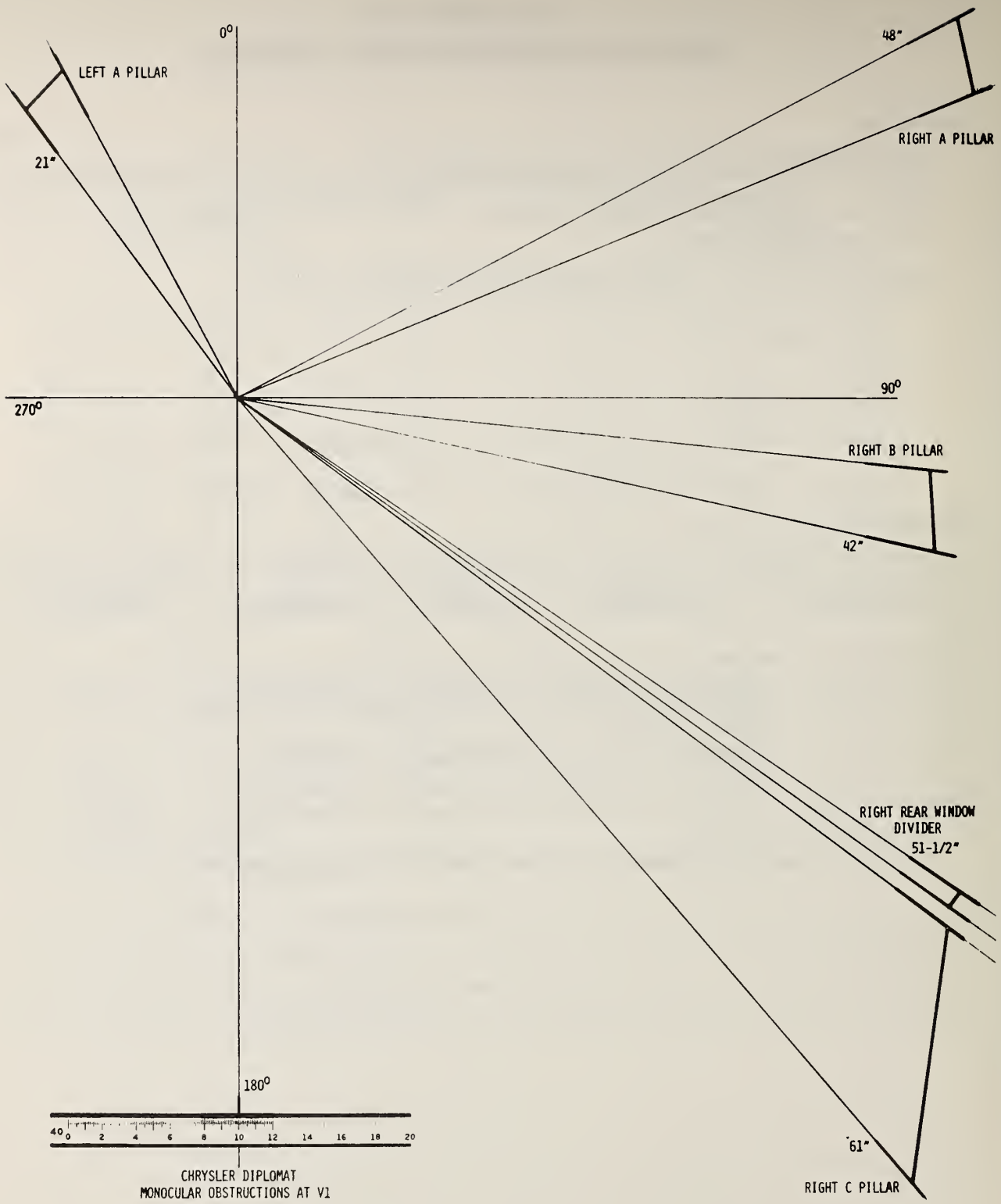
LOCATION OF "V" POINT RELATIVE TO THE "R" Point

	V_1	V_2
X	3.01	3.01
Y	-0.20	-0.20
Z	26.68	23.68

OBSTRUCTIONS: Zone IV

Elevation	Obstruction	Left Angle	Right Angle	Obstruction Angle
V_1	Right B Pillar	96°08'	102°33'	6°25'
	Rear Window Divider	124°18'	125°40'	1°22'
	Right C Pillar	126°46'	139°14'	12°28'
			Total	20°15'

Explanations Pertinent to the Specific Measurements:



Plan View of Monocular Obstructions at V_1 - Chrysler Diplomat.

DATA SHEET 2

MONOCULAR OBSTRUCTION ANGLE FROM V_2

VEHICLE:

MANUFACTURER Chrysler Corporation YEAR 1978

MODEL Dodge Diplomat BODY STYLE .4 Door

VIN GH41D86243883

LOCATION OF "V" POINT RELATIVE TO THE "R" Point

	V_1	V_2
X	3.01	3.01
Y	-0.20	-0.20
Z	26.68	23.68

OBSTRUCTIONS: Zone I

Elevation	Obstruction	Left Angle	Right Angle	Obstruction Angle
V_2	Left A Pillar	326°12'	333°10'	6°58'

Total 6°58'

Explanations Pertinent to the Specific Measurements:

DATA SHEET 2

MONOCULAR OBSTRUCTION ANGLE FROM V_2

VEHICLE:

MANUFACTURER Chrysler Corporation YEAR 1978

MODEL Dodge Diplomat BODY STYLE 4 Door

VIN GH41D86243883

LOCATION OF "V" POINT RELATIVE TO THE "R" Point

	V_1	V_2
X	3.01	3.01
Y	-0.20	-0.20
Z	26.68	23.68

OBSTRUCTIONS: Zone II

Elevation	Obstruction	Left Angle	Right Angle	Obstruction Angle
V_2	Right A Pillar	58°54'	63°53'	4°59'

Total 4°59'

Explanations Pertinent to the Specific Measurements:

DATA SHEET 2

MONOCULAR OBSTRUCTION ANGLE FROM V

VEHICLE:

MANUFACTURER Chrysler Corporation YEAR 1978

MODEL Dodge Diplomat BODY STYLE 4 Door

VIN GH41D86243883

LOCATION OF "V" POINT RELATIVE TO THE "R" Point

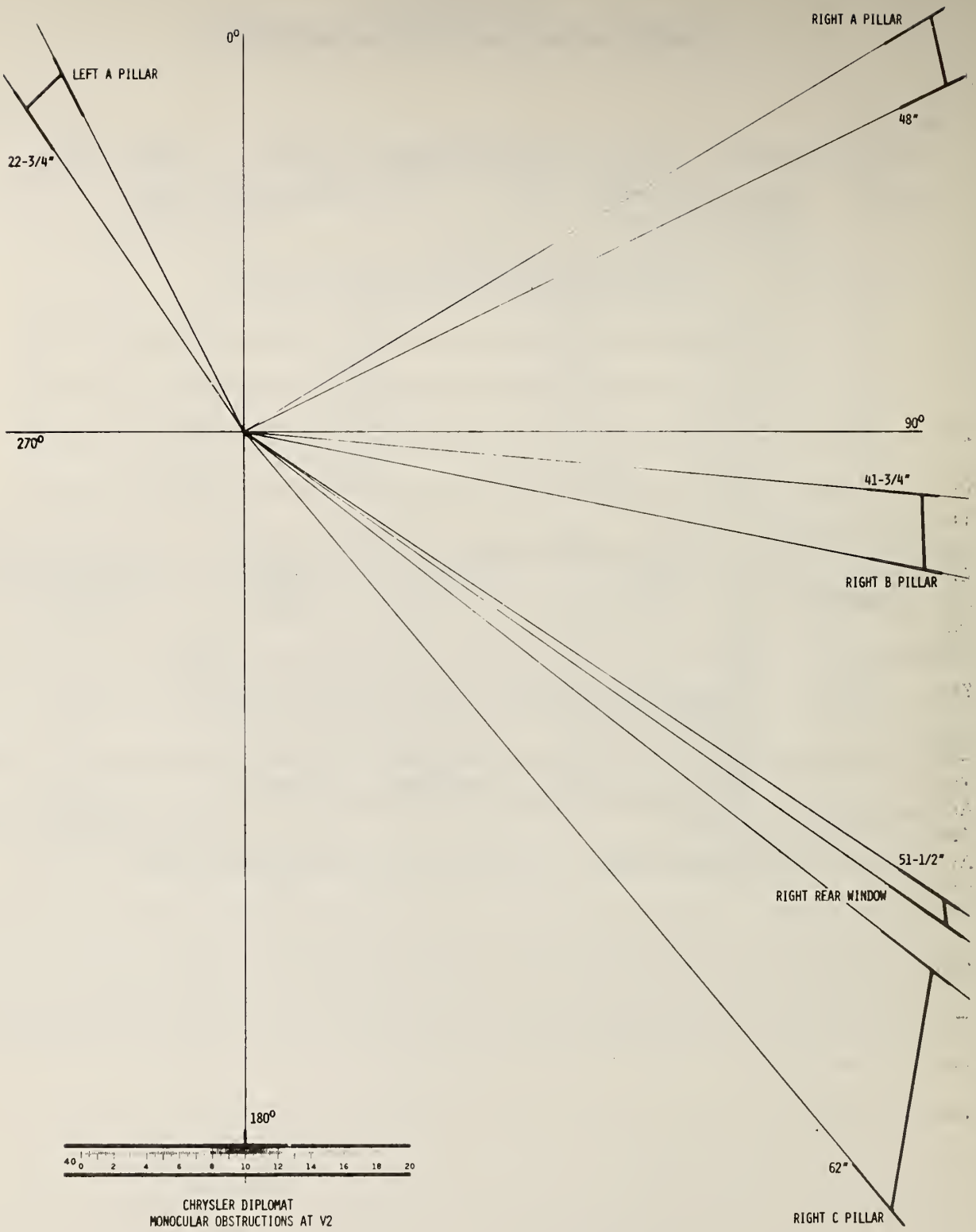
	V_1	V_2
X	3.01	3.01
Y	-0.20	-0.20
Z	26.68	23.68

OBSTRUCTIONS: Zone IV

Elevation	Obstruction	Left Angle	Right Angle	Obstruction Angle
V_2	Right B Pillar	95°03'	101°23'	6°20'
	Rear Window Divider	123°45'	125°04'	1°19'
	Right C Pillar	128°04'	140°13'	12°09'

Total 19°48'

Explanations Pertinent to the Specific Measurements:



Plan View of Monocular Obstructions at V_2 - Chrysler Diplomat.

DATA SHEET 4

BINOCULAR OBSTRUCTION ANGLES

VEHICLE:

MANUFACTURER Chrysler Corporation YEAR 1978

MODEL Dodge Diplomat BODY STYLE 4 Door

VIN GH41D86243883

	Dimensions Relative to "R" Point		
	X	Y	Z
P_1	0.10	0.80	24.56
P_2	1.20	1.85	24.56

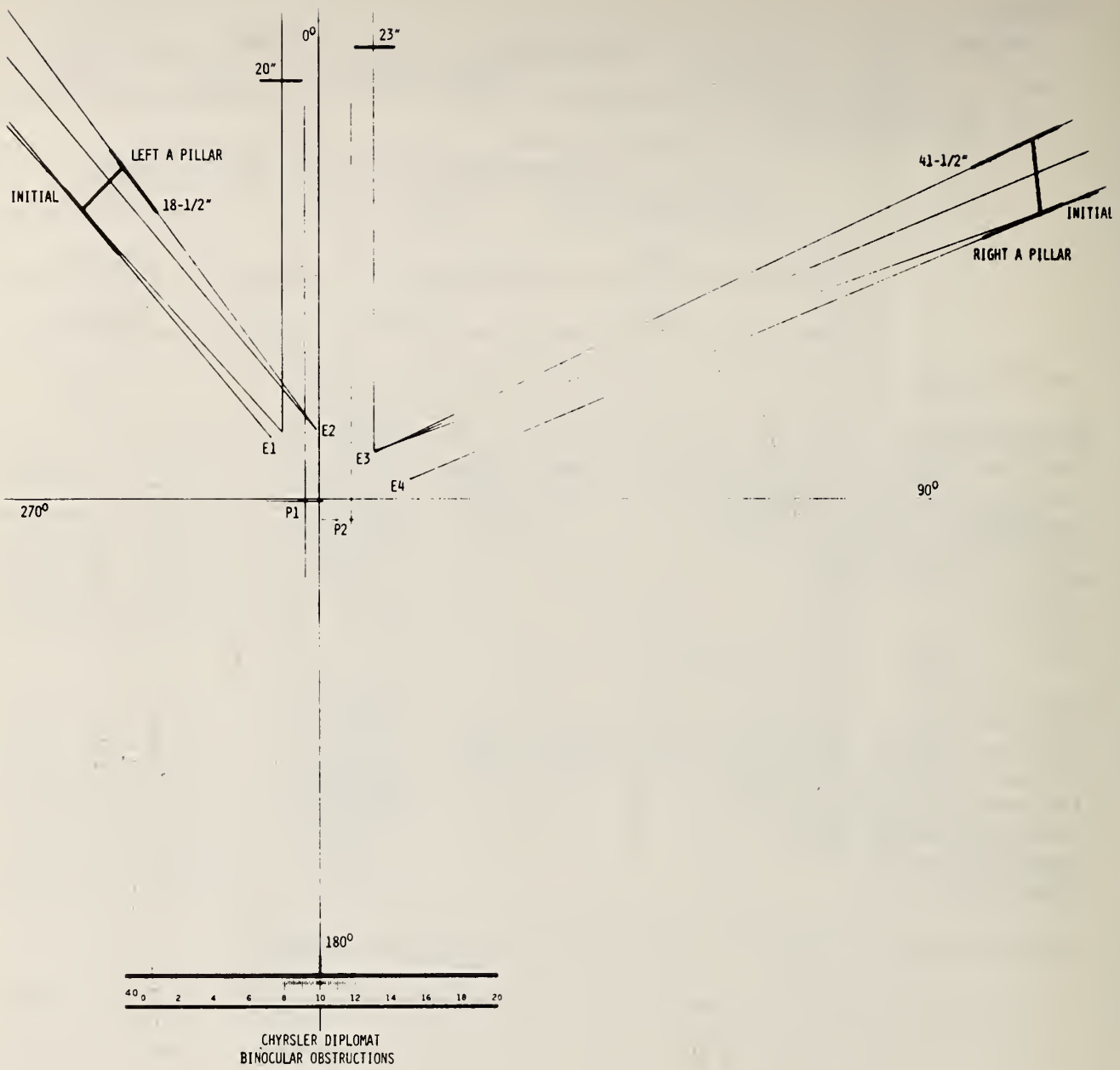
Zone: I

Obstruction	Left A Pillar		
Initial Sight to Outboard E - Rear Side	318°12'		
Adjusted Sight to Outboard E - Rear Side	330°01'		
Inboard E - Front Side	333°30'		
Angle to Bench Mark			
Obstruction Angle	3°29'		
Azimuth			

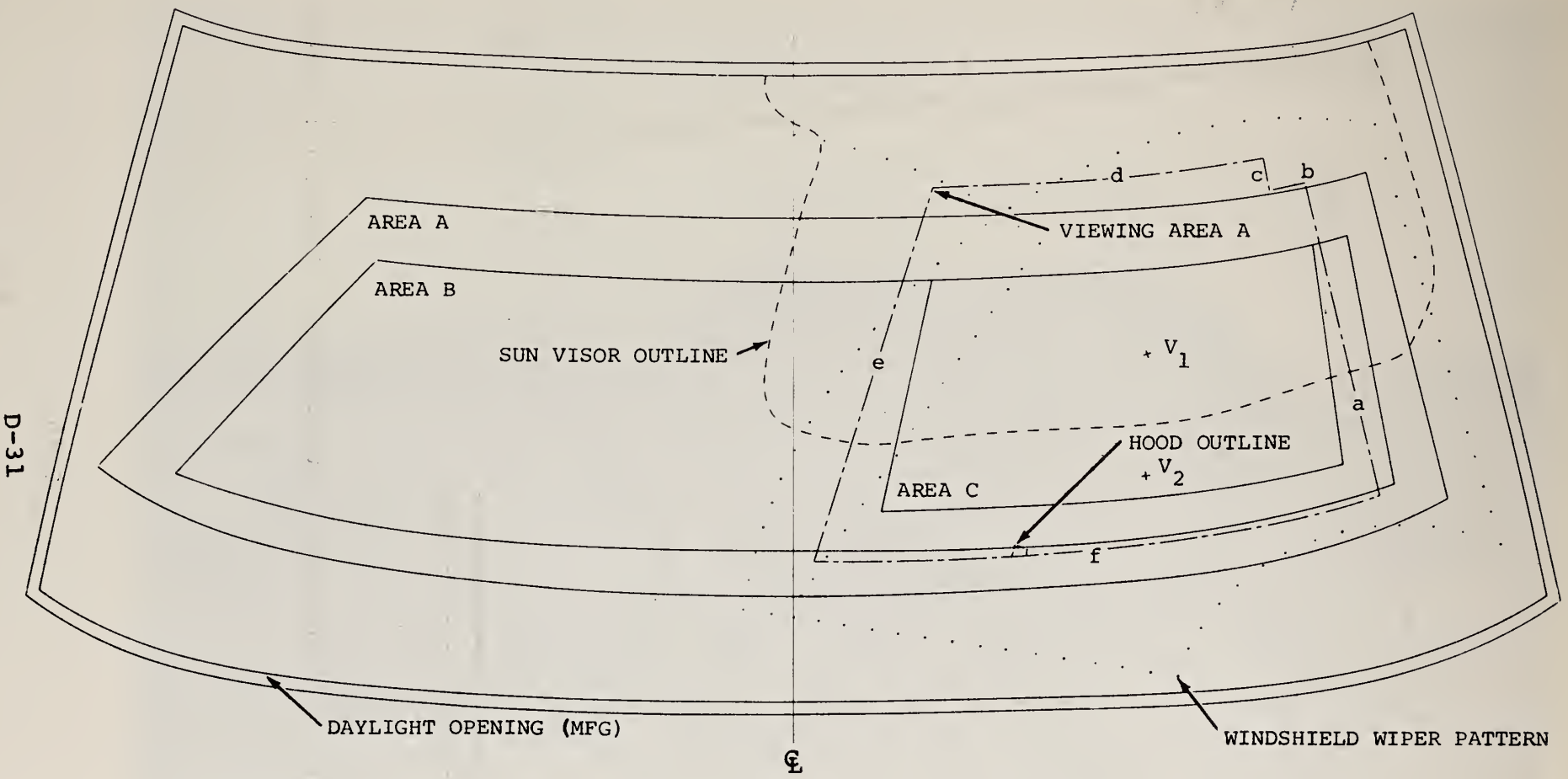
Zone: II

Obstruction	Right A Pillar		
Initial Sight to Outboard E - Rear Side	70°01'		
Adjusted Sight to Outboard E - Rear Side	29°55'		
Inboard E - Front Side	27°08'		
Angle to Bench Mark			
Obstruction Angle	2°47'		
Azimuth			

Explanations Pertinent to the Specific Measurements:



Plan View of Binocular Obstructions - Chrysler Diplomat.



Windshield Overlay Showing Relationship Between Critical Areas per FMVSS 104 and View Area A as Measured for This Vehicle - Chrysler Diplomat.

DATA SHEET 3

WINDSHIELD AREAS

VEHICLE:

MANUFACTURER Chrysler Corporation YEAR 1978

MODEL Dodge Diplomat BODY STYLE 4 Door

VIN GH41D86243883

VIEW AREA DIMENSIONAL MEASUREMENTS

Relative to Windshield Points

"A" Pillar to Side a 5.84

"A" Pillar to Side c 7.04

DLO Top of Windshield to Side d 4.53

DLO Bottom of Windshield to Side f 6.00

Relative to Critical A, B, C Areas

	A	B	C
Side a Leftward to	2.68	0.71	-1.17
Side c Leftward to	3.93	2.78	1.52
Side e Rightward to	22.87	21.63	-1.19
Side d Upward to	-1.27	-3.81	-3.81
Side f Downward to	1.41	-0.28	-1.95

Critical Areas (A, B, C) Relative to Windshield Points

	A	B	C
"A" Pillar to	3.20	5.14	6.98
DLO Top of Windshield to	5.80	8.34	8.34
DLO Bottom of Windshield to	4.59	6.28	7.95

Left Front Three-Quarter View - 1978 Dodge Diplomat 4-Door Sedan.

Right Rear Three-Quarter View - 1978 Dodge Diplomat 4-Door Sedan.

APPENDIX D3 - PLYMOUTH ARROW

DATA SHEET NO. 1 - VEHICLE DATA

VEHICLE:

MANUFACTURER Chrysler Corporation YEAR 1978

MODEL Plymouth Arrow BODY STYLE 2 Door

VIN 7L24K81104177 ODOMETER 1858.7

BUILD DATE 1/78

SPECIAL OPTIONS

FRONT SEAT TYPE: SPECIFIED Bucket

TILT STEERING WHEEL? YES X NO

FRONT SEAT TRAVEL RANGE: SPECIFIED 6.50 in.

FRONT SEAT BACK ANGLE: SPECIFIED 24°

MEASURING POINT CORRECTIONS

	X (in.)	Z (in.)
P From Table 2	-1.89	--
P From Table 3	-0.34	+0.10
Total P	-2.23	+0.10
V From Table 3	-0.34	+0.10

MANUFACTURER'S REFERENCE POINTS FOR SRP

For X 52.95 in. to Zero X Plane L31

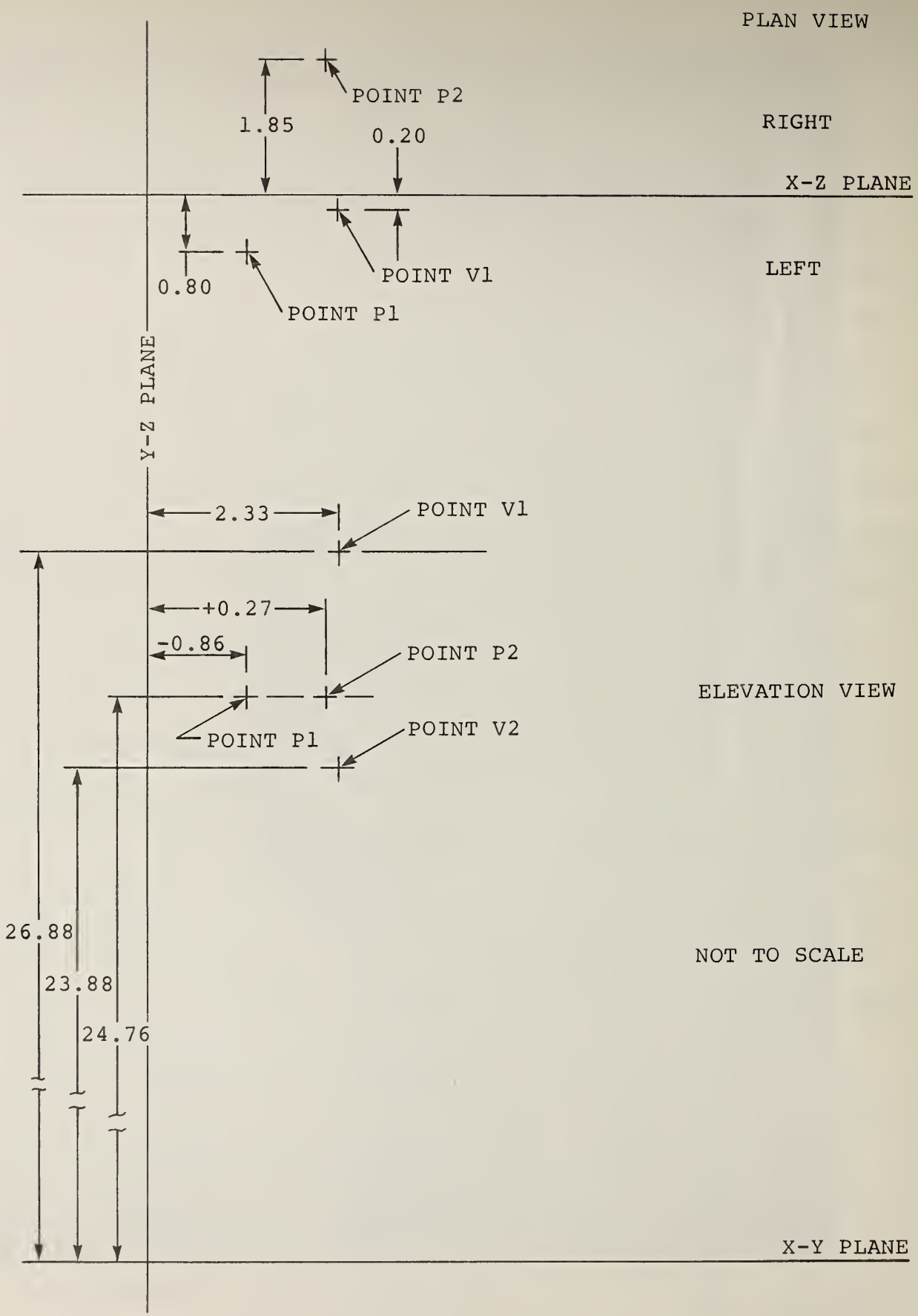
For Y 12.32 in. to Zero Y Plane W20

For Z 9.72 in. to Zero Z Plane H70

MANUFACTURER'S DIMENSIONS FOR VEHICLE ATTITUDE

	From Front Axle Centerline	From Vehicle Centerline	Height Above Ground*
Front Station	0.78 in.	±13.43 in.	12.03 in.
Rear Station	115.55 in.	±18.90 in.	13.02 in.
SRP	52.95 in.	12.32 in.	17.03 in.
"R" Point	52.95 in.	13.27 in.	17.03 in.

*At design load.



Relationship of Reference Points -
1978 Plymouth Arrow 2-Door Hatchback Coupe.

DATA SHEET 2

MONOCULAR OBSTRUCTION ANGLE FROM V_1

VEHICLE:

MANUFACTURER Chrysler Corporation YEAR 1978

MODEL Plymouth Arrow BODY STYLE 2 Door

VIN 7L24K81104177

LOCATION OF "V" POINT RELATIVE TO THE "R" Point

	V_1	V_2
X	2.33	2.33
Y	-0.20	-0.20
Z	26.88	23.88

OBSTRUCTIONS: Zone I

Elevation	Obstruction	Left Angle	Right Angle	Obstruction Angle
V_1	Left A Pillar	322°40'	335°36'	12°56'

Total 12°56'

Explanations Pertinent to the Specific Measurements:

DATA SHEET 2

MONOCULAR OBSTRUCTION ANGLE FROM V_1

VEHICLE:

MANUFACTURER Chrysler Corporation YEAR 1978

MODEL Plymouth Arrow BODY STYLE 2 Door

VIN 7L24K81104177

LOCATION OF "V" POINT RELATIVE TO THE "R" Point

	V_1	V_2
X	2.33	2.33
Y	-0.20	-0.20
Z	26.88	23.88

OBSTRUCTIONS: Zone II

Elevation	Obstruction	Left Angle	Right Angle	Obstruction Angle
V_1	Inside Rear View Mirror	30°15'	51°23'	21°8'
V_1	Right A Pillar	63°15'	71°37'	8°22'

Total 29°30'

Explanations Pertinent to the Specific Measurements:

DATA SHEET 2

MONOCULAR OBSTRUCTION ANGLE FROM V_1

VEHICLE:

MANUFACTURER Chrysler Corporation YEAR 1978

MODEL Plymouth Arrow BODY STYLE 2 Door

VIN 7L24K81104177

LOCATION OF "V" POINT RELATIVE TO THE "R" Point

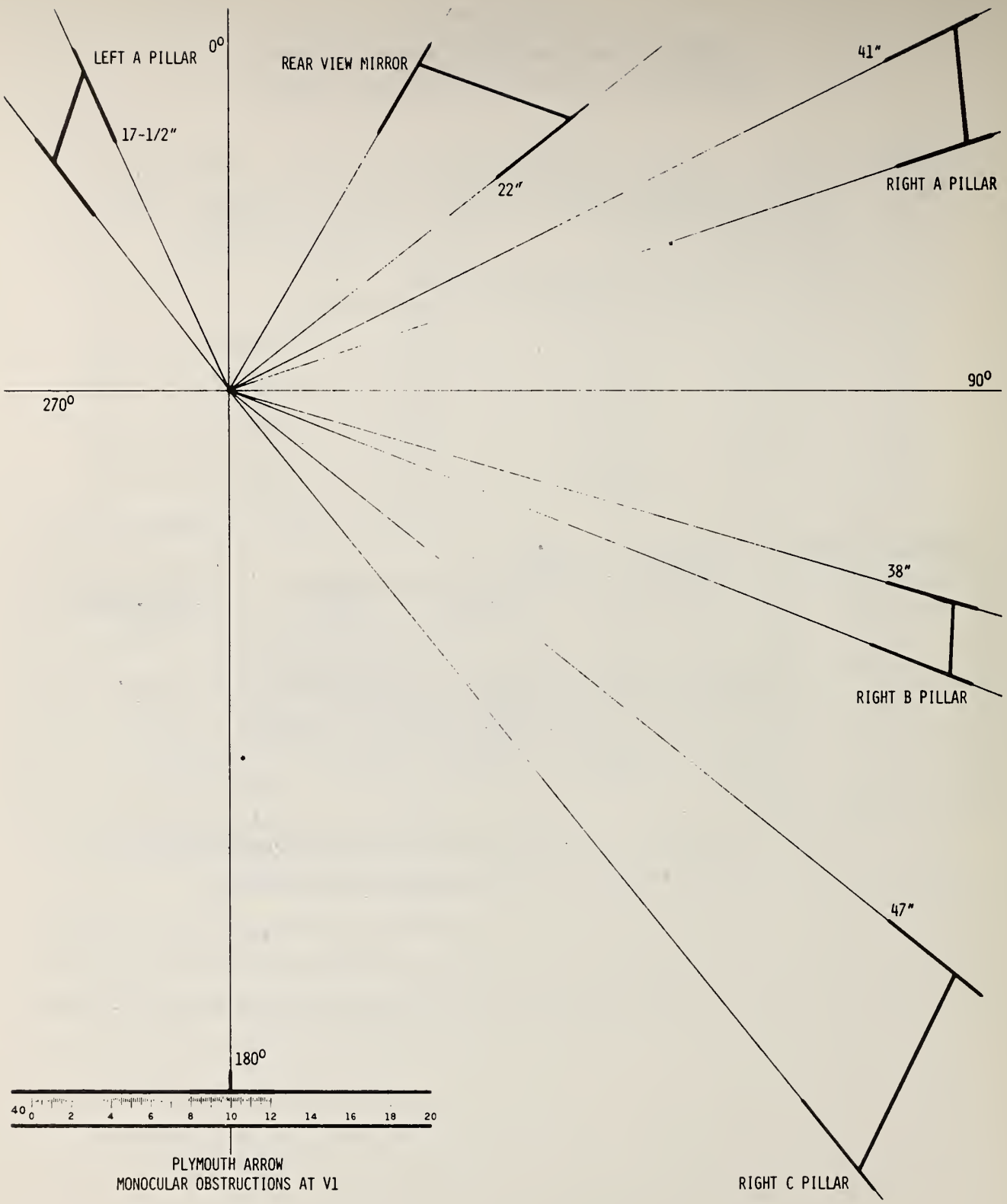
	V_1	V_2
X	2.33	2.33
Y	-0.20	-0.20
Z	26.88	23.88

OBSTRUCTIONS: Zone IV

Elevation	Obstruction	Left Angle	Right Angle	Obstruction Angle
V_1	Right B Pillar	106°19'	111°38'	5°19'
V_1	Right C Pillar	128°54'	141°13'	12°19'

Total 17°38'

Explanations Pertinent to the Specific Measurements:



Plan View of Monocular Obstructions at V_1 - Plymouth Arrow.

DATA SHEET 2

MONOCULAR OBSTRUCTION ANGLE FROM V_2

VEHICLE:

MANUFACTURER Chrysler Corporation YEAR 1978

MODEL Plymouth Arrow BODY STYLE 2 Door

VIN 7L24K81104177

LOCATION OF "V" POINT RELATIVE TO THE "R" Point

	V_1	V_2
X	2.33	2.33
Y	-0.20	-0.20
Z	26.88	23.88

OBSTRUCTIONS: Zone I

Elevation	Obstruction	Left Angle	Right Angle	Obstruction Angle
V_2	Left A Pillar	323°8'	337°37'	9°29'

Total 9°29'

Explanations Pertinent to the Specific Measurements:

DATA SHEET 2

MONOCULAR OBSTRUCTION ANGLE FROM V_2

VEHICLE:

MANUFACTURER Chrysler Corporation YEAR 1978

MODEL Plymouth Arrow BODY STYLE 2 Door

VIN 7L24K81104177

LOCATION OF "V" POINT RELATIVE TO THE "R" Point

	V_1	V_2
X	2.33	2.33
Y	-0.20	-0.20
Z	26.88	23.88

OBSTRUCTIONS: Zone II

Elevation	Obstruction	Left Angle	Right Angle	Obstruction Angle
V_2	Right A Pillar	58°11'	65°30'	7°19'

Total 7°19'

Explanations Pertinent to the Specific Measurements:

DATA SHEET 2

MONOCULAR OBSTRUCTION ANGLE FROM V_2

VEHICLE:

MANUFACTURER Chrysler Corporation YEAR 1978

MODEL Plymouth Arrow BODY STYLE 2 Door

VIN 7L24K81104177

LOCATION OF "V" POINT RELATIVE TO THE "R" Point

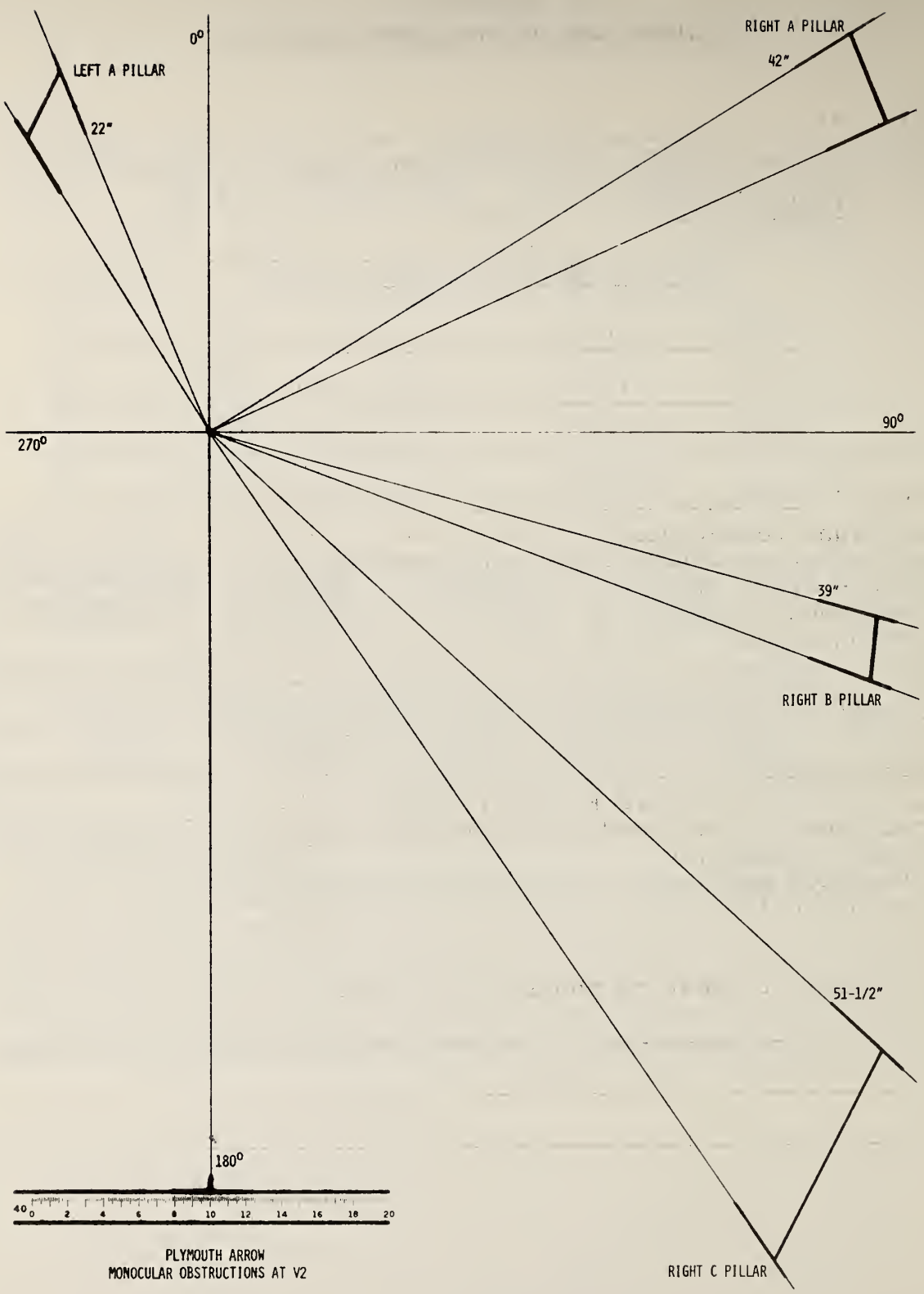
	V_1	V_2
X	2.33	2.33
Y	-0.20	-0.20
Z	26.88	23.88

OBSTRUCTIONS: Zone IV

Elevation	Obstruction	Left Angle	Right Angle	Obstruction Angle
V_2	Right B Pillar	105°23'	110°40'	5°17'
V_2	Right C Pillar	132°34'	145°44'	13°10'

Total 18°27'

Explanations Pertinent to the Specific Measurements:



Plan View of Monocular Obstructions at V_2 - Plymouth Arrow.

DATA SHEET 4

BINOCULAR OBSTRUCTION ANGLES

VEHICLE:

MANUFACTURER Chrysler Corporation YEAR 1978

MODEL Plymouth Arrow BODY STYLE 2 Door

VIN 7L24K81104177

	Dimensions Relative to "R" Point		
	X	Y	Z
P_1	-0.86	-0.80	24.76
P_2	+0.27	+1.85	24.76

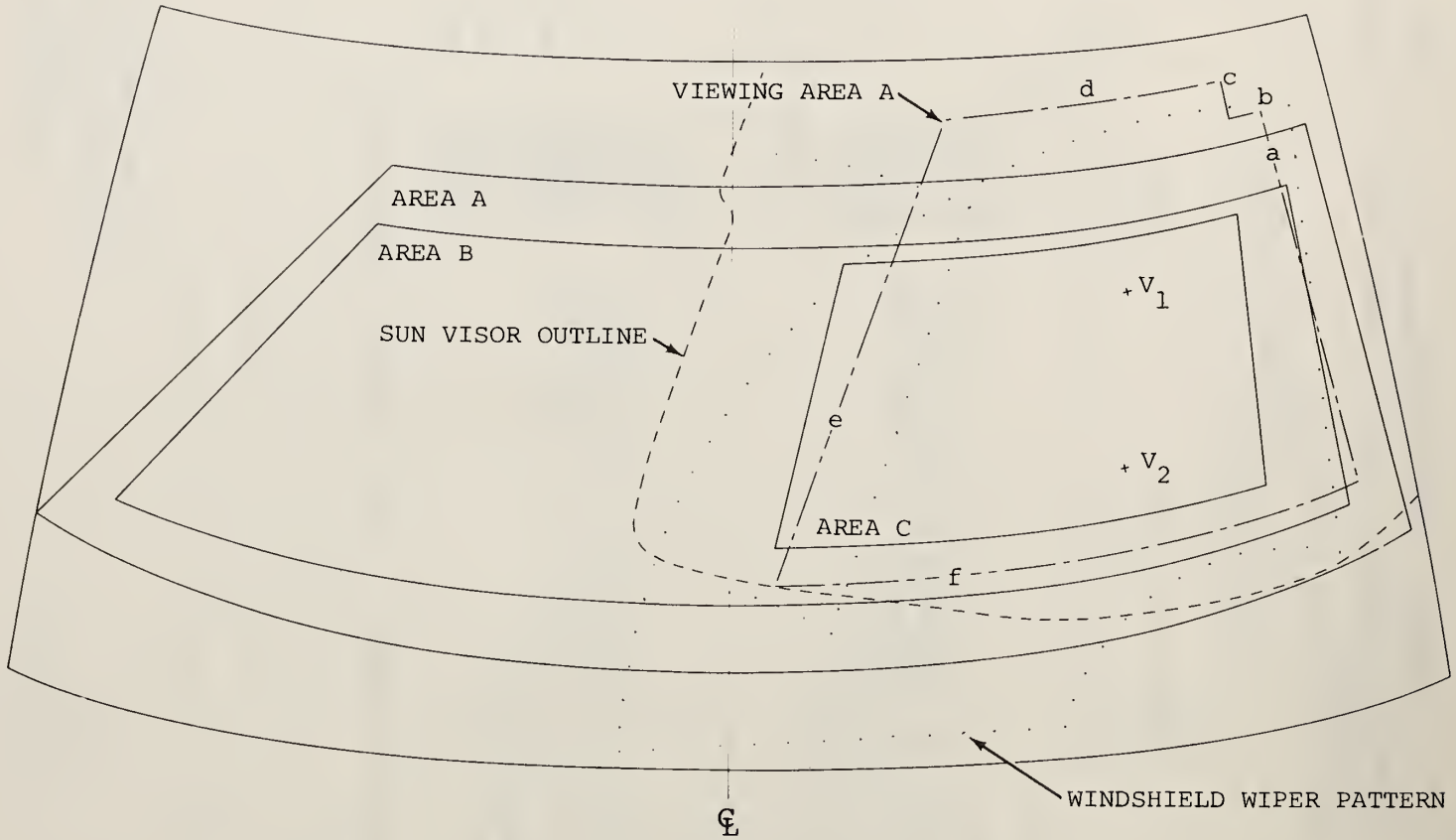
Zone: I

Obstruction	Left A Pillar		
Initial Sight to Outboard E - Rear Side	317°03'		
Adjusted Sight to Outboard E - Rear Side	330°07'		
Inboard E - Front Side	337°47'		
Angle to Bench Mark			
Obstruction Angle	7°47'		
Azimuth			

Zone: II

Obstruction	Right A Pillar		
Initial Sight to Outboard E - Rear Side	73°42'		
Adjusted Sight to Outboard E - Rear Side	29°07'		
Inboard E - Front Side	23°38'		
Angle to Bench Mark			
Obstruction Angle	5°29'		
Azimuth			

Explanations Pertinent to the Specific Measurements:



Windshield Overlay Showing Relationship Between Critical Areas per FMVSS 104 and View Area A as Measured for This Vehicle - Plymouth Arrow.

DATA SHEET 3

WINDSHIELD AREAS

VEHICLE:

MANUFACTURER Chrysler Corporation YEAR 1978

MODEL Plymouth Arrow BODY STYLE 2 Door

VIN 7L24K81104177

VIEW AREA DIMENSIONAL MEASUREMENTS

Relative to Windshield Points

"A" Pillar to Side a 2.06

"A" Pillar to Side c 3.69

DLO Top of Windshield to Side d 2.03

DLO Bottom of Windshield to Side f 6.83

Relative to Critical A, B, C Areas

	A	B	C
Side a Leftward to	1.38	-0.50	-3.15
Side c Leftward to	2.53	1.58	0.06
Side e Rightward to	18.74	18.50	1.84
Side d Upward to	-2.19	-4.29	-4.85
Side f Downward to	2.87	0.59	-1.37

Critical Areas (A, B, C) Relative to Windshield Points

	A	B	C
"A" Pillar to	0.57	2.57	5.27
DLO Top of Windshield to	4.22	6.32	6.88
DLO Bottom of Windshield to	3.96	6.24	8.20

Left Front Three-Quarter View - 1978 Plymouth Arrow 2-Door Hatchback Coupe.

Right Rear Three-Quarter View - 1978 Plymouth Arrow 2-Door Hatchback Coupe.

APPENDIX D4 - PLYMOUTH HORIZON

DATA SHEET NO. 1 - VEHICLE DATA

VEHICLE:

MANUFACTURER Chrysler Corporation YEAR 1978

MODEL Plymouth Horizon BODY STYLE 4 Door

VIN ML44A8D146972 ODOMETER 5837

BUILD DATE 3/78

SPECIAL OPTIONS

FRONT SEAT TYPE: SPECIFIED Bucket

TILT STEERING WHEEL? YES ____ NO X

FRONT SEAT TRAVEL RANGE: SPECIFIED 7.5 in.

FRONT SEAT BACK ANGLE: SPECIFIED 26°

MEASURING POINT CORRECTIONS

	X (in.)	Z (in.)
P From Table 2	-1.89	--
P From Table 3	+0.34	-0.10
Total P	-1.55	-0.10
V From Table 3	+0.34	-0.10

MANUFACTURER'S REFERENCE POINTS FOR SRP

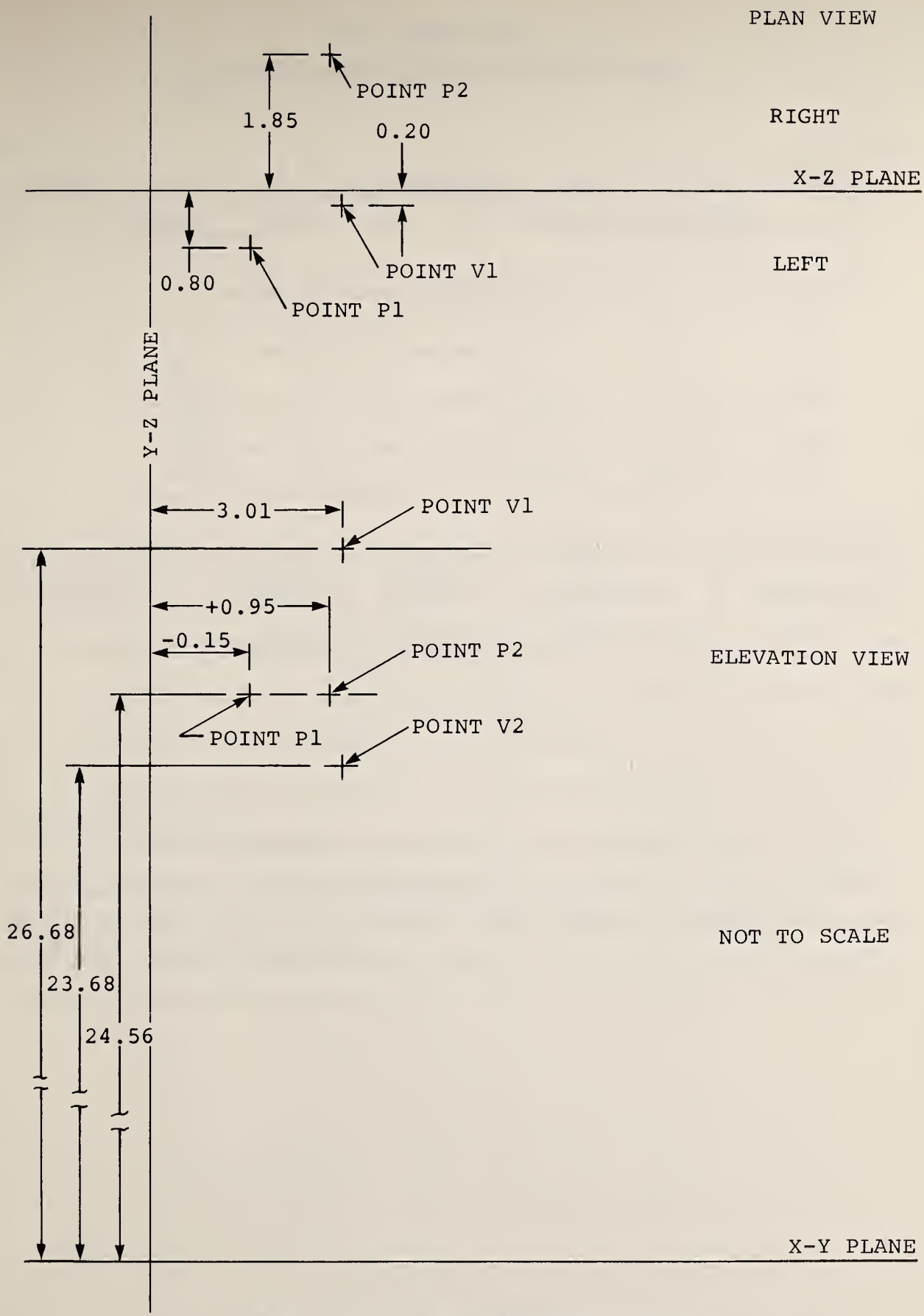
For X 55.5 in. to Zero X Plane L31

For Y 13.0 in. to Zero Y Plane W20

For Z 11.6 in. to Zero Z Plane H70

MANUFACTURER'S DIMENSIONS FOR VEHICLE ATTITUDE

	From Front Axle Centerline	From Vehicle Centerline	Height Above Ground
Front Station	26.0 in.	±16.30 in.	5.49 in.
Rear Station	119.1 in.	±19.76 in.	13.80 in.
SRP	52.0 in.	13.0 in.	18.69 in.
"R" Point	52.0 in.	13.84 in.	18.69 in.



Relationship of Reference Points –
1978 Plymouth Horizon 4-Door Hatchback Sedan.

DATA SHEET 2

MONOCULAR OBSTRUCTION ANGLE FROM V_1

VEHICLE:

MANUFACTURER Chrysler Corporation YEAR 1978

MODEL Plymouth Horizon BODY STYLE 4 Door

VIN ML44A8D146972

LOCATION OF "V" POINT RELATIVE TO THE "R" Point

	V_1	V_2
X	3.01	3.01
Y	-0.20	-0.20
Z	26.68	23.68

OBSTRUCTIONS: Zone I

Elevation	Obstruction	Left Angle	Right Angle	Obstruction Angle
V_1	Left A Pillar	328°44'	338°01'	9°17'

Total 9°17'

Explanations Pertinent to the Specific Measurements:

DATA SHEET 2

MONOCULAR OBSTRUCTION ANGLE FROM V_1

VEHICLE:

MANUFACTURER Chrysler Corporation YEAR 1978

MODEL Plymouth Horizon BODY STYLE 4 Door

VIN ML44A8D146972

LOCATION OF "V" POINT RELATIVE TO THE "R" Point

	V_1	V_2
X	3.01	3.01
Y	-0.20	-0.20
Z	26.68	23.68

OBSTRUCTIONS: Zone II

Elevation	Obstruction	Left Angle	Right Angle	Obstruction Angle
V_1	Right A Pillar	60°30'	66°40'	6°10'

Total 6°10'

Explanations Pertinent to the Specific Measurements:

Rear View Mirror was approximately 0.9 in. above the V_1 plane. Angles at that level were 28°36' and 49°30' for a monocular obstruction angle of 20°54'.

DATA SHEET 2

MONOCULAR OBSTRUCTION ANGLE FROM V_1

VEHICLE:

MANUFACTURER Chrysler Corporation YEAR 1978

MODEL Plymouth Horizon BODY STYLE 4 Door

VIN ML44A8D146972

LOCATION OF "V" POINT RELATIVE TO THE "R" Point

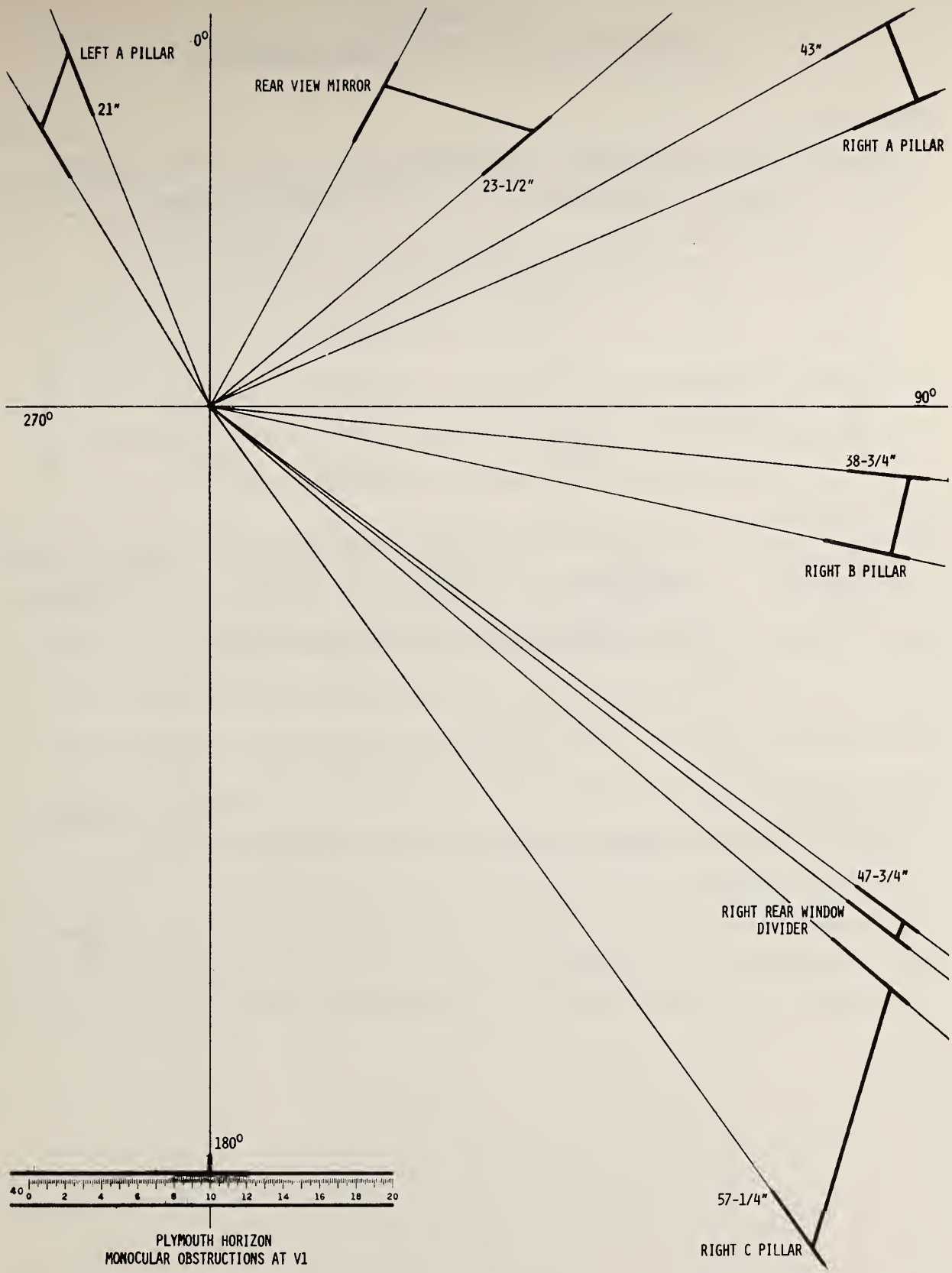
	V_1	V_2
X	3.01	3.01
Y	-0.20	-0.20
Z	26.68	23.68

OBSTRUCTIONS: Zone IV

Elevation	Obstruction	Left Angle	Right Angle	Obstruction Angle
V_1	Right B Pillar	95°55'	102°12'	6°17'
	Right Rear Window Divider	126°38'	127°51'	1°13'
	Right C Pillar	130°45'	144°15'	13°30'

Total 21°00'

Explanations Pertinent to the Specific Measurements:



Plan View of Monocular Obstructions at V_1 - Plymouth Horizon.

DATA SHEET 2

MONOCULAR OBSTRUCTION ANGLE FROM V_2

VEHICLE:

MANUFACTURER Chrysler Corporation YEAR 1978

MODEL Plymouth Horizon BODY STYLE 4 Door

VIN ML44A8D146972

LOCATION OF "V" POINT RELATIVE TO THE "R" Point

	V_1	V_2
X	3.01	3.01
Y	-0.20	-0.20
Z	26.68	23.68

OBSTRUCTIONS: Zone I

Elevation	Obstruction	Left Angle	Right Angle	Obstruction Angle
V2	Left A Pillar	330°41'	338°34'	7°53'

Total 7°53'

Explanations Pertinent to the Specific Measurements:

DATA SHEET 2

MONOCULAR OBSTRUCTION ANGLE FROM V_2

VEHICLE:

MANUFACTURER Chrysler Corporation YEAR 1978

MODEL Plymouth Horizon BODY STYLE 4 Door

VIN ML44A8D146972

LOCATION OF "V" POINT RELATIVE TO THE "R" Point

	V_1	V_2
X	3.01	3.01
Y	-0.20	-0.20
Z	26.68	23.68

OBSTRUCTIONS: Zone II

Elevation	Obstruction	Left Angle	Right Angle	Obstruction Angle
V_2	Right A Pillar	57°12'	63°00'	5°48'

Total 5°48'

Explanations Pertinent to the Specific Measurements:

DATA SHEET 2

MONOCULAR OBSTRUCTION ANGLE FROM V_2

VEHICLE:

MANUFACTURER Chrysler Corporation YEAR 1978

MODEL Plymouth Horizon BODY STYLE 4 Door

VIN ML44A8D146972

LOCATION OF "V" POINT RELATIVE TO THE "R" Point

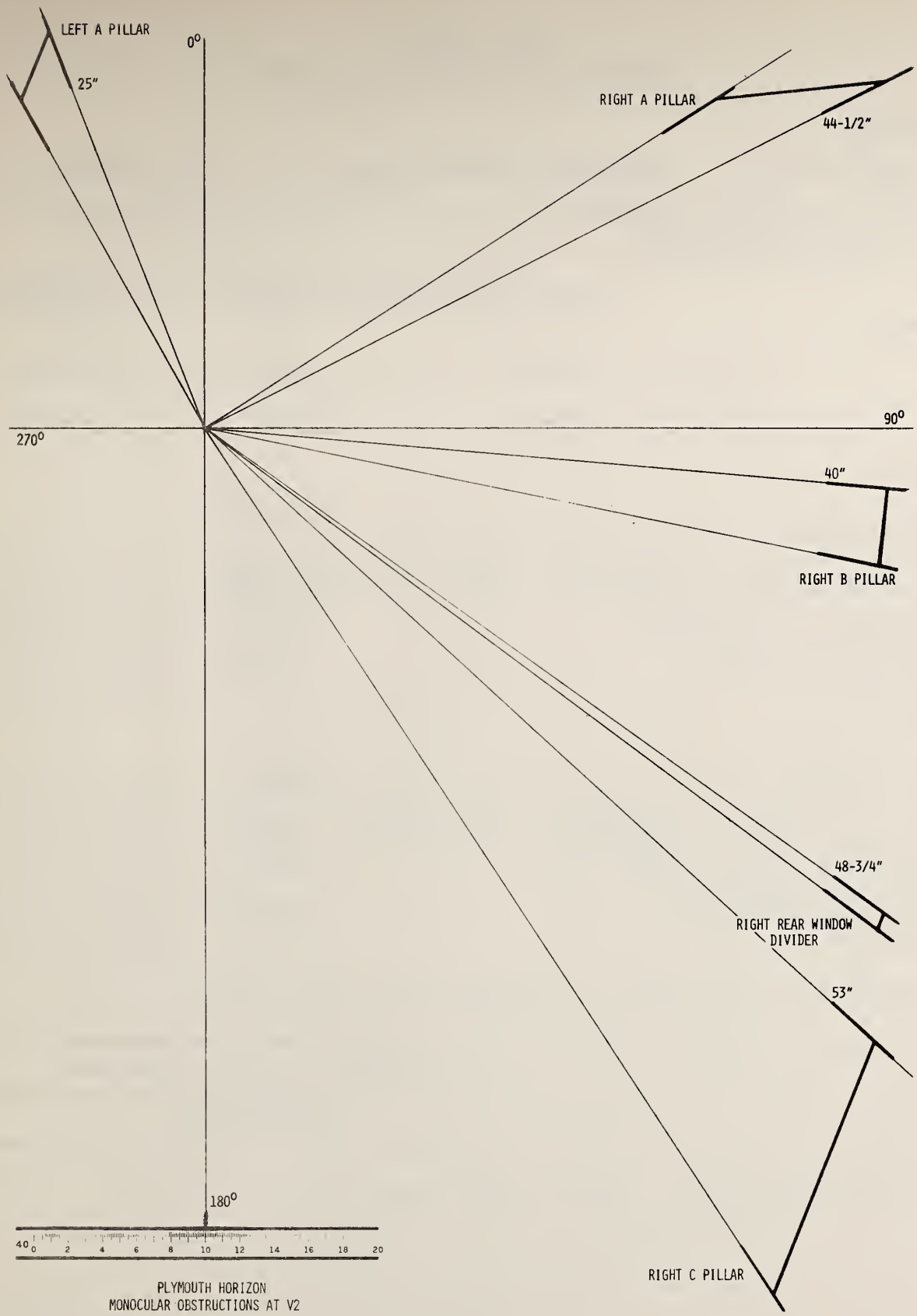
	V_1	V_2
X	3.01	3.01
Y	-0.20	-0.20
Z	26.68	23.68

OBSTRUCTIONS: Zone IV

Elevation	Obstruction	Left Angle	Right Angle	Obstruction Angle
V_2	Right B Pillar	95°02'	101°31'	6°29'
	Right Rear Window Divider	125°34'	126°46'	1°12'
	Right C Pillar	132°32'	145°54'	13°22'

Total 21°03'

Explanations Pertinent to the Specific Measurements:



Plan View of Monocular Obstructions at V_2 - Plymouth Horizon.

DATA SHEET 4

BINOCULAR OBSTRUCTION ANGLES

VEHICLE:

MANUFACTURER Chrysler Corporation YEAR 1978

MODEL Plymouth Horizon BODY STYLE 4 Door

VIN ML44A8D146972

	Dimensions Relative to "R" Point		
	X	Y	Z
P_1	-0.15	-0.80	24.56
P_2	+0.95	+1.85	24.56

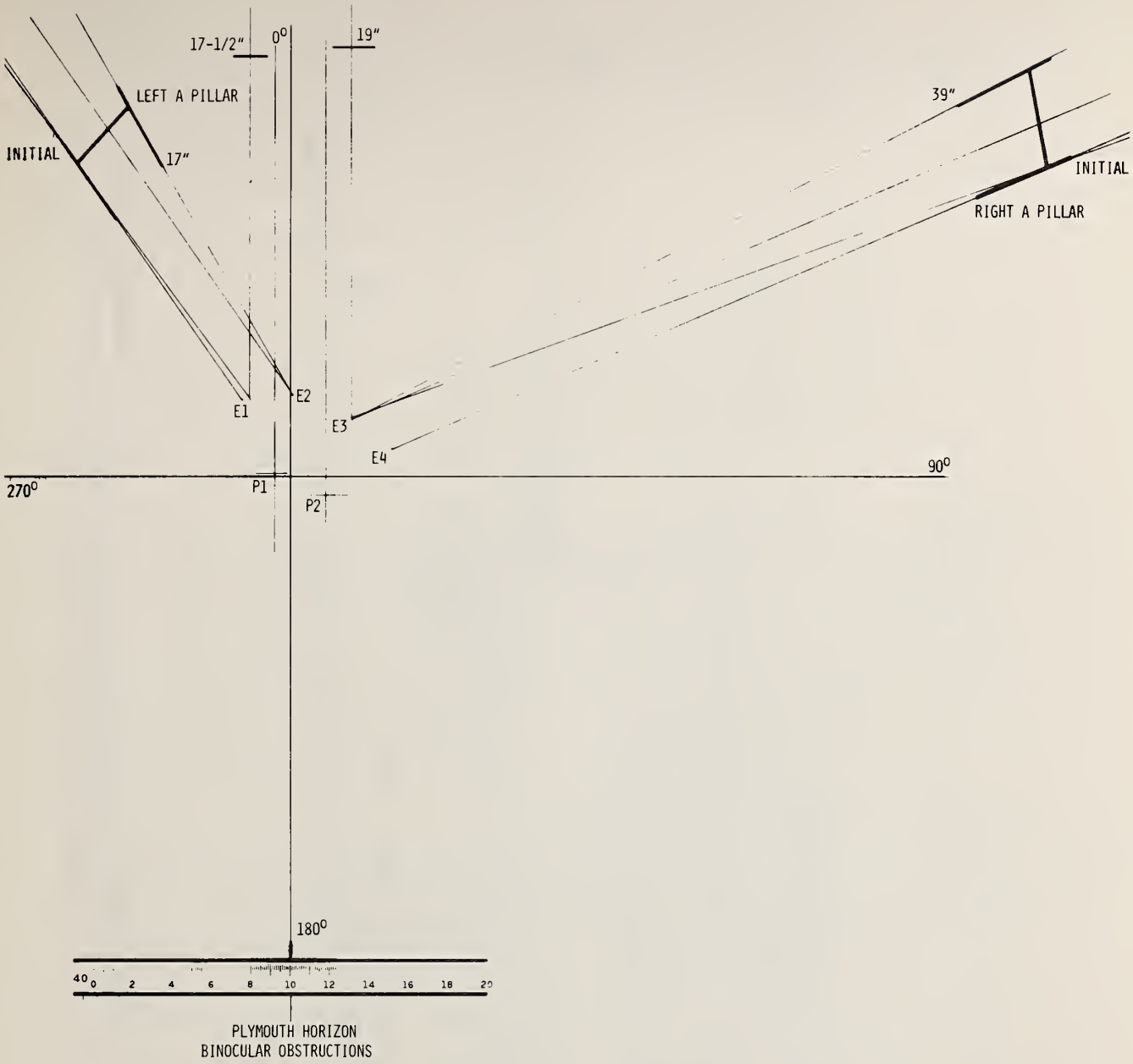
Zone: I

Obstruction	Left A Pillar		
Initial Sight to Outboard E - Rear Side	323°20'		
Adjusted Sight to Outboard E - Rear Side	330°18'		
Inboard E - Front Side	335°07'		
Angle to Bench Mark			
Obstruction Angle	4°49'		
Azimuth			

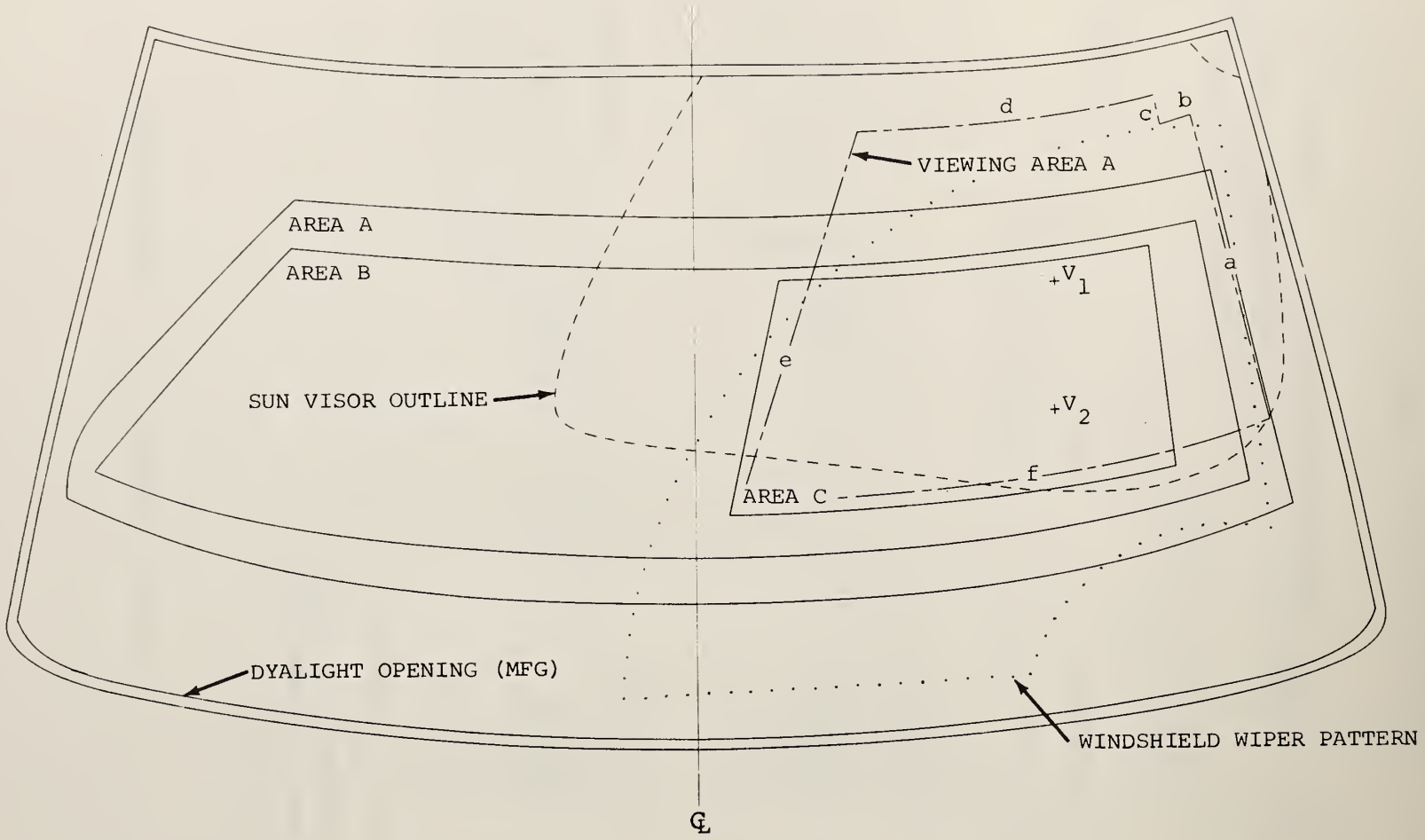
Zone: II

Obstruction	Right A Pillar		
Initial Sight to Outboard E - Rear Side	69°45'		
Adjusted Sight to Outboard E - Rear Side	29°29'		
Inboard E - Front Side	25°53'		
Angle to Bench Mark			
Obstruction Angle	3°36'		
Azimuth			

Explanations Pertinent to the Specific Measurements:



Plan View of Binocular Obstructions - Plymouth Horizon.



Windshield Overlay Showing Relationship Between Critical Areas per FMVSS 104 and View Area A as Measured for This Vehicle - Plymouth Horizon.

DATA SHEET 3

WINDSHIELD AREAS

VEHICLE:

MANUFACTURER Chrysler Corporation YEAR 1978

MODEL Plymouth Horizon BODY STYLE 4 Door

VIN ML44A8D146972

VIEW AREA DIMENSIONAL MEASUREMENTS

Relative to Windshield Points

"A" Pillar to Side a 2.4

"A" Pillar to Side c 3.5

DLO Top of Windshield to Side d 7.7

DLO Bottom of Windshield to Side f 9.8

Relative to Critical A, B, C Areas

	A	B	C
Side a Leftward to	0.1	-1.3	-3.9
Side c Leftward to	(side c is above the A, B, C areas)		
Side e Rightward to	20.8	20.5	1.2
Side d Upward to	-3.2	-5.1	-5.7
Side f Downward to	4.0	2.2	0.6

Critical Areas (A, B, C) Relative to Windshield Points

	A	B	C
"A" Pillar to	2.2	3.7	6.4
DLO Top of Windshield to	9.2	7.2	7.7
DLO Bottom of Windshield to	5.4	7.2	8.8

Left Front Three-Quarter View - 1978 Plymouth Horizon 4-Door Hatchback Sedan.

Right Reat Three-Quarter View - 1978 Plymouth Horizon 4-Door Hatchback Sedan.

APPENDIX D5 - PLYMOUTH VOLARE

DATA SHEET NO. 1 - VEHICLE DATA

VEHICLE:

MANUFACTURER Chrysler Corporation YEAR 1978

MODEL Plymouth Volare BODY STYLE 2 Door

VIN HL29D8B296470 ODOMETER 1383

BUILD DATE 4/78

SPECIAL OPTIONS

FRONT SEAT TYPE: SPECIFIED Bench

TILT STEERING WHEEL? YES ____ NO X

FRONT SEAT TRAVEL RANGE: SPECIFIED 5.9

FRONT SEAT BACK ANGLE: SPECIFIED 26.0

MEASURING POINT CORRECTIONS

	X (in.)	Z (in.)
P From Table 2	-1.64	--
P From Table 3	+0.34	-0.10
Total P	-1.30	-0.10
V From Table 3	+0.34	-0.10

MANUFACTURER'S REFERENCE POINTS FOR SRP

For X 44.1 in. to Zero X Plane L31

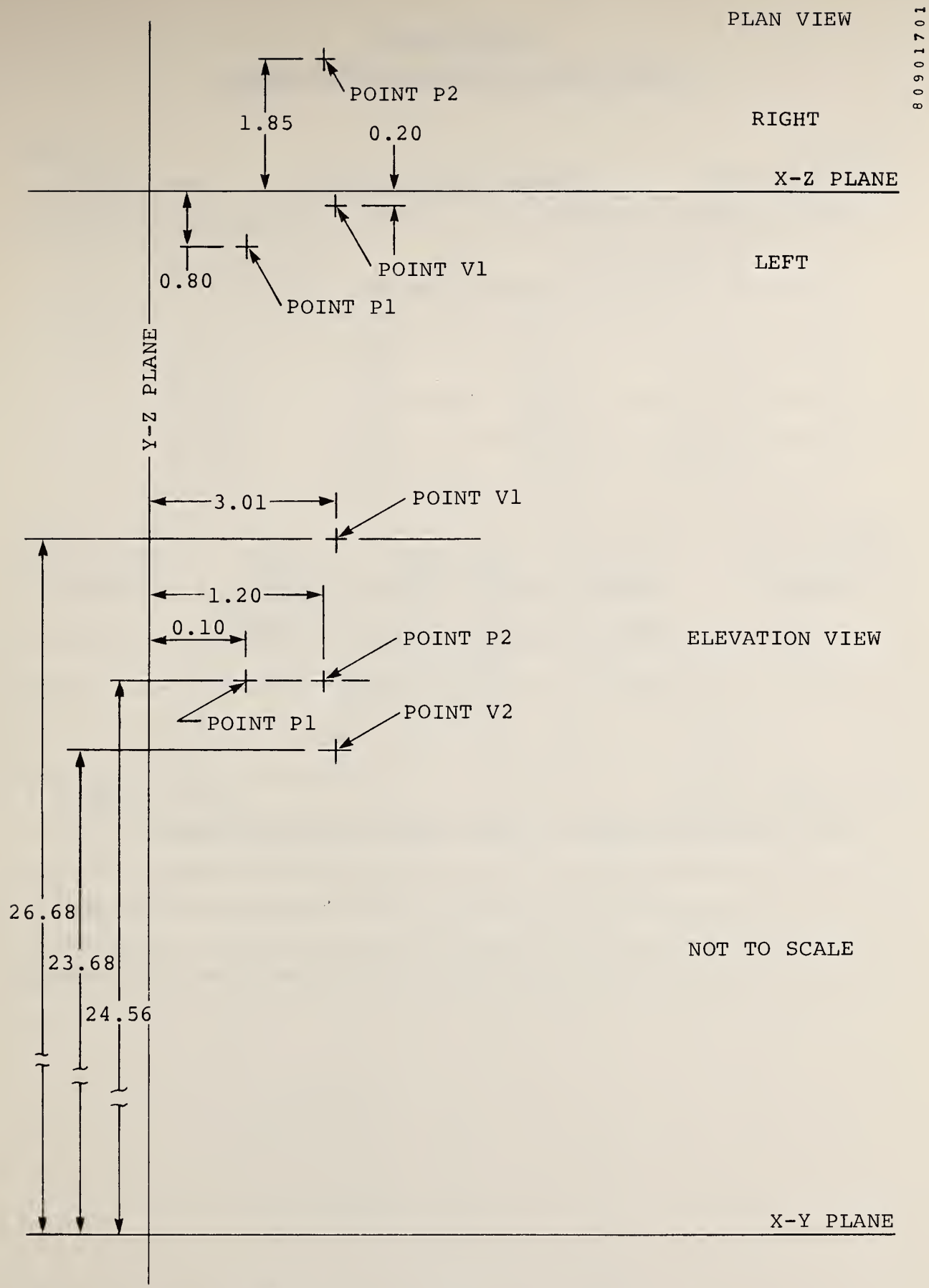
For Y ±14.0 in. to Zero Y Plane W20

For Z 6.40 in. to Zero Z Plane H70

MANUFACTURER'S DIMENSIONS FOR VEHICLE ATTITUDE

	From Front Axle Centerline	From Vehicle Centerline	Height Above Ground With Zero Z-Plane Level
Front Station	36.5 in.	±16.25 in.	6.95
Rear Station	83.0 in.	±17.60 in.	5.84
SRP	59.4 in.	-14.00 in.	18.98
"R" Point	59.4 in.	-14.61 in.	18.98

*NOTE: With full passenger load (no cargo), the Zero Z-Plane has an elevation above ground at 12.8 inches at the front axle and 12.4 inches at the rear axle. Station elevations are then 7.04 inches (front) and 5.75 inches (rear). "R" point elevation is 18.98 inches.



Relationship of References Points –
1978 Plymouth Volare 2-Door Coupe.

DATA SHEET 2

MONOCULAR OBSTRUCTION ANGLE FROM V_1

VEHICLE:

MANUFACTURER Chrysler Corporation YEAR 1978

MODEL Plymouth Volare BODY STYLE 2 Door

VIN HL29D8B296470

LOCATION OF "V" POINT RELATIVE TO THE "R" Point

	V_1	V_2
X	3.01	3.01
Y	-0.20	-0.20
Z	26.68	23.68

OBSTRUCTIONS: Zone I

Elevation	Obstruction	Left Angle	Right Angle	Obstruction Angle
V_1	Left A Pillar	322°42'	330°56'	8°14'

Total 8°14'

Explanations Pertinent to the Specific Measurements:

DATA SHEET 2

MONOCULAR OBSTRUCTION ANGLE FROM V_1

VEHICLE:

MANUFACTURER Chrysler Corporation YEAR 1978

MODEL Plymouth Volare BODY STYLE 2 Door

VIN HL29D8B296470

LOCATION OF "V" POINT RELATIVE TO THE "R" Point

	V_1	V_2
X	3.01	3.01
Y	-0.20	-0.20
Z	26.68	23.68

OBSTRUCTIONS: Zone II

Elevation	Obstruction	Left Angle	Right Angle	Obstruction Angle
V_1	Rear View Mirror	24°49'	53°12'	28°23'
	Right A Pillar	66°00'	71°06'	5°06'

Total 33°29'

Explanations Pertinent to the Specific Measurements:

DATA SHEET 2

MONOCULAR OBSTRUCTION ANGLE FROM V_1

VEHICLE:

MANUFACTURER Chrysler Corporation YEAR 1978

MODEL Plymouth Volare BODY STYLE 2 Door

VIN HL29D8B296470

LOCATION OF "V" POINT RELATIVE TO THE "R" Point

	V_1	V_2
X	3.01	3.01
Y	-0.20	-0.20
Z	26.68	23.68

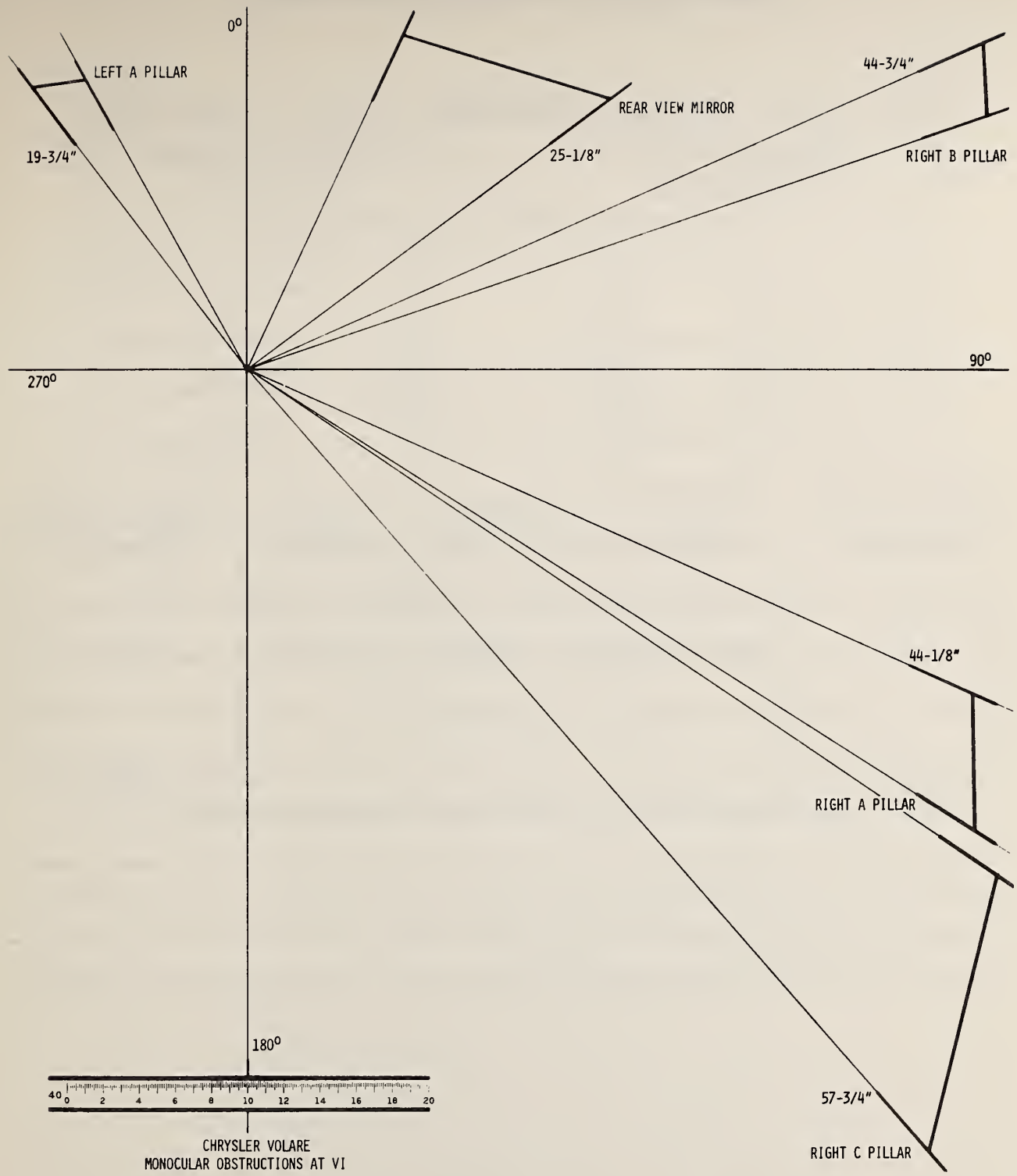
OBSTRUCTIONS: Zone IV

Elevation	Obstruction	Left Angle	Right Angle	Obstruction Angle
V_1	Right B Pillar	114°04'	122°21'	8°17'
	Right C Pillar*	124°02'	138°59'	14°57'

Total 23°14'

Explanations Pertinent to the Specific Measurements:

*C Pillar Measurement Left Angle Intercepts Top of Window as Shown:



Plan View of Monocular Obstructions at V_1 - Chrysler Volare.

DATA SHEET 2

MONOCULAR OBSTRUCTION ANGLE FROM V_2

VEHICLE:

MANUFACTURER Chrysler Corporation YEAR 1978

MODEL Plymouth Volare BODY STYLE 2 Door

VIN HL29D8B296470

LOCATION OF "V" POINT RELATIVE TO THE "R" Point

	V_1	V_2
X	3.01	3.01
Y	-0.20	-0.20
Z	26.68	23.68

OBSTRUCTIONS: Zone I

Elevation	Obstruction	Left Angle	Right Angle	Obstruction Angle
V_2	Left A Pillar	325°26'	331°56'	6°30'

Total 6°30'

Explanations Pertinent to the Specific Measurements:

DATA SHEET 2

MONOCULAR OBSTRUCTION ANGLE FROM V_2

VEHICLE:

MANUFACTURER Chrysler Corporation YEAR 1978

MODEL Plymouth Volare BODY STYLE 2 Door

VIN HL29D8B296470

LOCATION OF "V" POINT RELATIVE TO THE "R" Point

	V_1	V_2
X	3.01	3.01
Y	-0.20	-0.20
Z	26.68	23.68

OBSTRUCTIONS: Zone II

Elevation	Obstruction	Left Angle	Right Angle	Obstruction Angle
V2	Right A Pillar	62°13'	66°39'	4°26'

Total 4°26'

Explanations Pertinent to the Specific Measurements:

DATA SHEET 2

MONOCULAR OBSTRUCTION ANGLE FROM V_2

VEHICLE:

MANUFACTURER Chrysler Corporation YEAR 1978

MODEL Plymouth Volare BODY STYLE 2 Door

VIN HL29D8B296470

LOCATION OF "V" POINT RELATIVE TO THE "R" Point

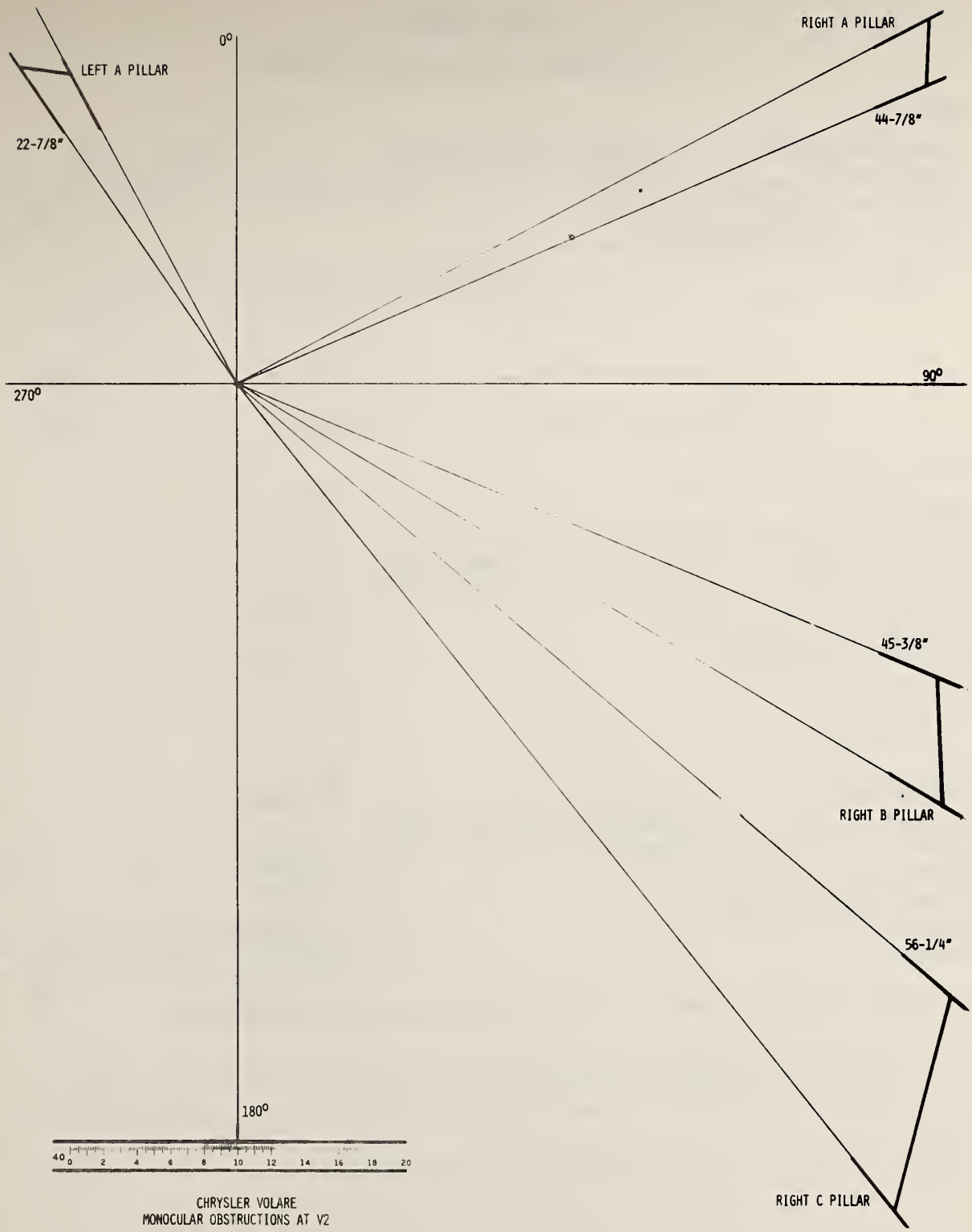
	V_1	V_2
X	3.01	3.01
Y	-0.20	-0.20
Z	26.68	23.68

OBSTRUCTIONS: Zone IV

Elevation	Obstruction	Left Angle	Right Angle	Obstruction Angle
V_2	Right B Pillar	112°45'	120°57'	8°12'
	Right C Pillar	130°34'	141°24'	10°50'

Total 19°02'

Explanations Pertinent to the Specific Measurements:



Plan View of Monocular Obstructions at V_2 - Chrysler Volare.

DATA SHEET 4

BINOCULAR OBSTRUCTION ANGLES

VEHICLE:

MANUFACTURER Chrysler Corporation YEAR 1978

MODEL Plymouth Volare BODY STYLE 2 Door

VIN HL29D8B296470

	Dimensions Relative to SRP		
	X	Y	Z
P_1	0.10	-0.80	24.56
P_2	1.20	+1.85	24.56

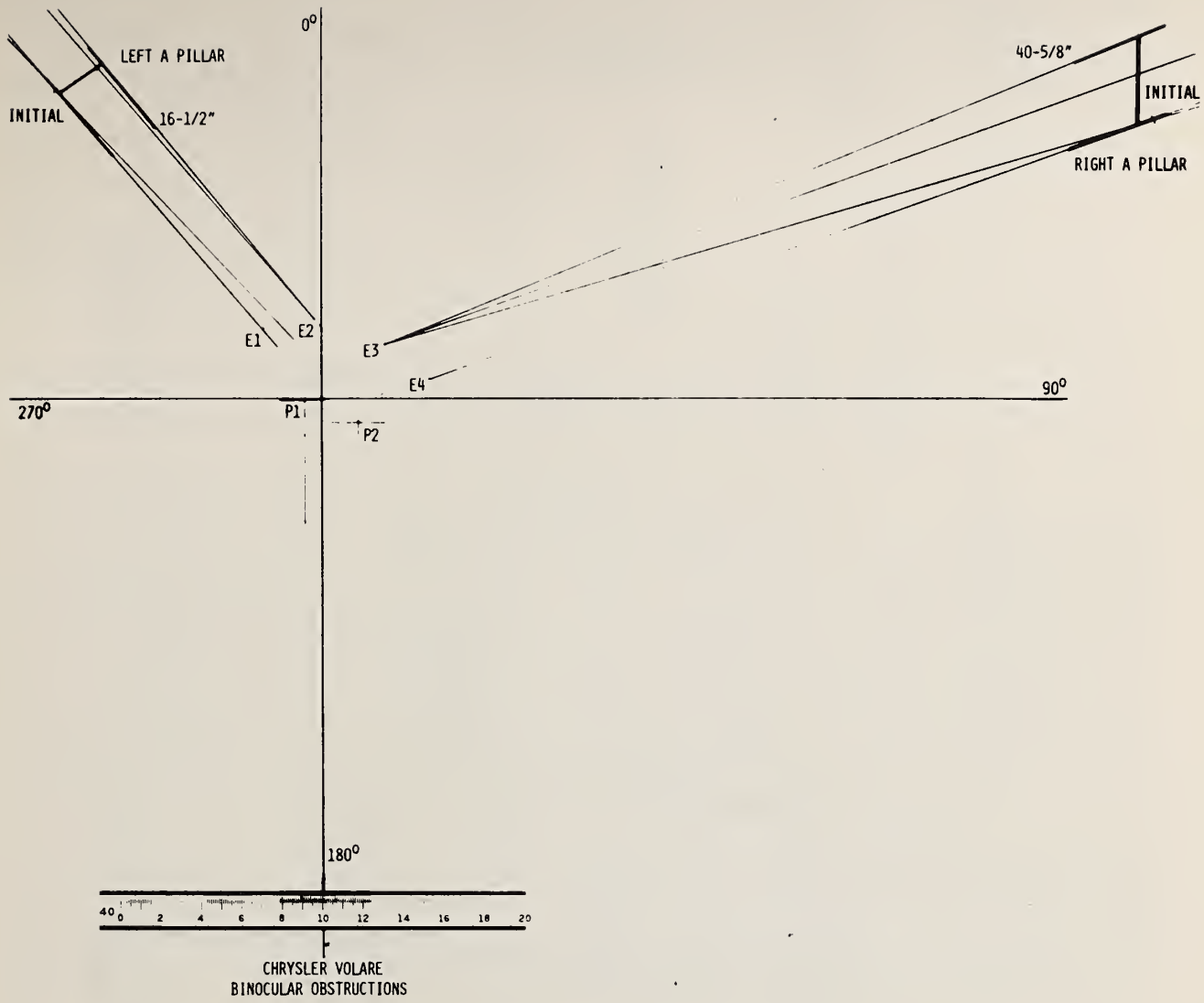
Zone: I

Obstruction	Left A Pillar		
Initial Sight to Outboard E - Rear Side	316°30'		
Adjusted Sight to Outboard E - Rear Side	330°00'		
Inboard E - Front Side	331°12'		
Angle to Bench Mark			
Obstruction Angle	1°12'		
Azimuth			

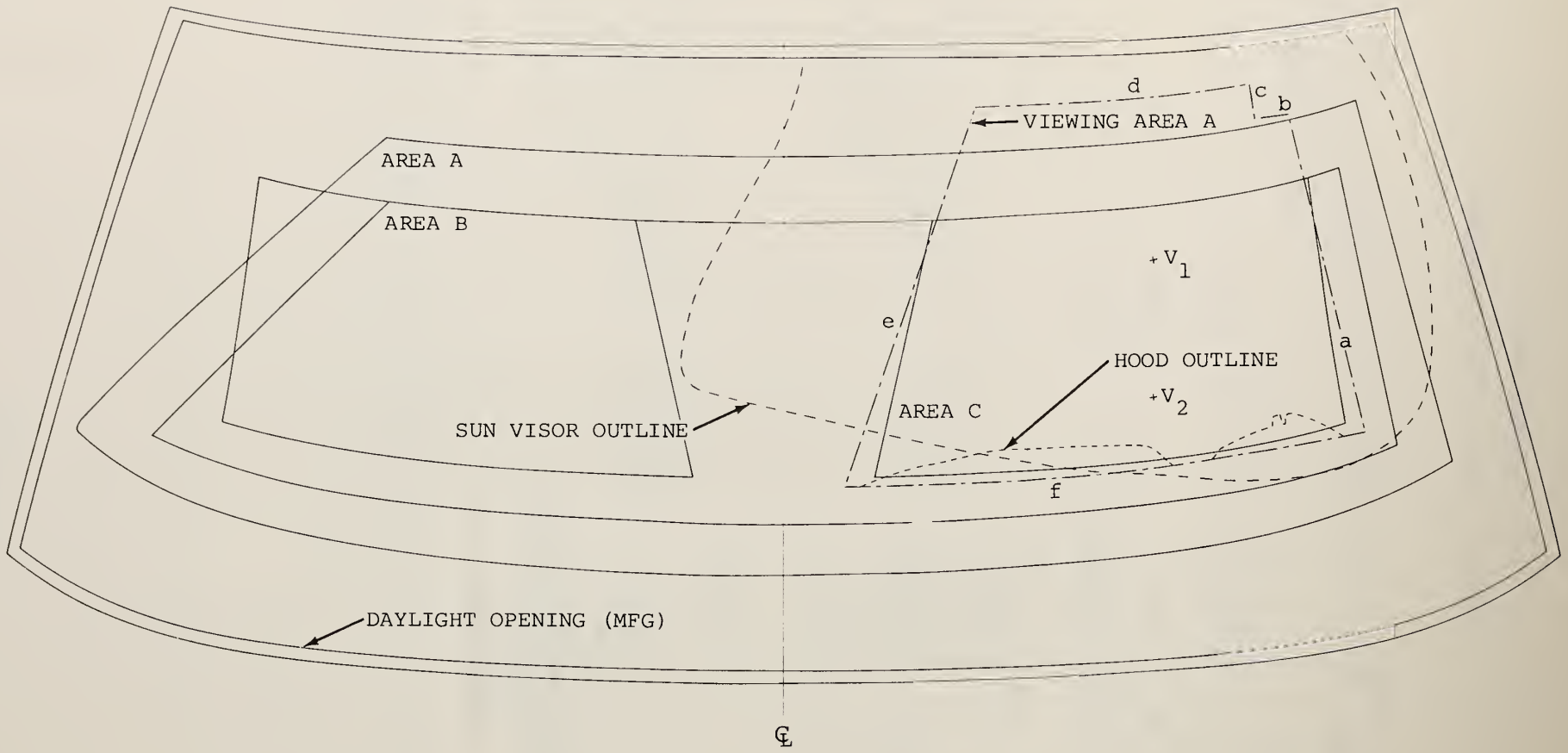
Zone: II

Obstruction	Right A Pillar		
Initial Sight to Outboard E - Rear Side	73°47'		
Adjusted Sight to Outboard E - Rear Side	30°00'		
Inboard E - Front Side	27°43'		
Angle to Bench Mark			
Obstruction Angle	2°17'		
Azimuth			

Explanations Pertinent to the Specific Measurements:



Plan View of Binocular Obstructions - Chrysler Volare.



Windshield Overlay Showing Relationship Between Critical Areas per FMVSS 104 and View Area A as Measured for This Vehicle - Chrysler Volare.

DATA SHEET 3

WINDSHIELD AREAS

VEHICLE:

MANUFACTURER Chrysler Corporation YEAR 1978

MODEL Plymouth Volare BODY STYLE 2 Door

VIN HL29D8B296470

VIEW AREA DIMENSIONAL MEASUREMENTS

Relative to Windshield Points

"A" Pillar to Side a 5.90

"A" Pillar to Side c 6.18

DLO Top of Windshield to Side d 1.84

DLO Bottom of Windshield to Side f 7.67

Relative to Critical A, B, C Areas

	A	B	C
Side a Leftward to	3.12	1.17	-0.70
Side c Leftward to	3.98	2.84	1.74
Side e Rightward to	23.19	22.00	0.16
Side d Upward to	-1.8	-4.43	-4.43
Side f Downward to	3.48	1.44	-0.35

Critical Areas (A, B, C) Relative to Windshield Points

	A	B	C
"A" Pillar to	2.78	4.73	6.55
DLO Top of Windshield to	3.64	6.27	6.27
DLO Bottom of Windshield to	4.19	6.23	8.02

Left Front Three-Quarter View - 1978 Plymouth Volare 2-Door Coupe.

Right Reat Three-Quarter View - 1978 Plymouth Volare 2-Door Coupe.

APPENDIX E

VISIBILITY MEASUREMENT ON AMERICAN MOTORS CORPORATION VEHICLES

APPENDIX E1 - AMC CONCORD

DATA SHEET NO. 1 - VEHICLE DATA

VEHICLE:

MANUFACTURER American Motors YEAR 1978

MODEL Concord BODY STYLE 2 Door

VIN A8A067L399954 ODOMETER 150

BUILD DATE 3/78

SPECIAL OPTIONS

FRONT SEAT TYPE: SPECIFIED Bucket

TILT STEERING WHEEL? YES X NO

FRONT SEAT TRAVEL RANGE: SPECIFIED 4.88 in.

FRONT SEAT BACK ANGLE: SPECIFIED 24°

MEASURING POINT CORRECTIONS

	X (in.)	Z (in.)
P From Table 2	-0.88	--
P From Table 3	-0.34	+0.10
Total P	-1.22	+0.10
V From Table 3	-0.34	+0.10

MANUFACTURER'S REFERENCE POINTS FOR SRP

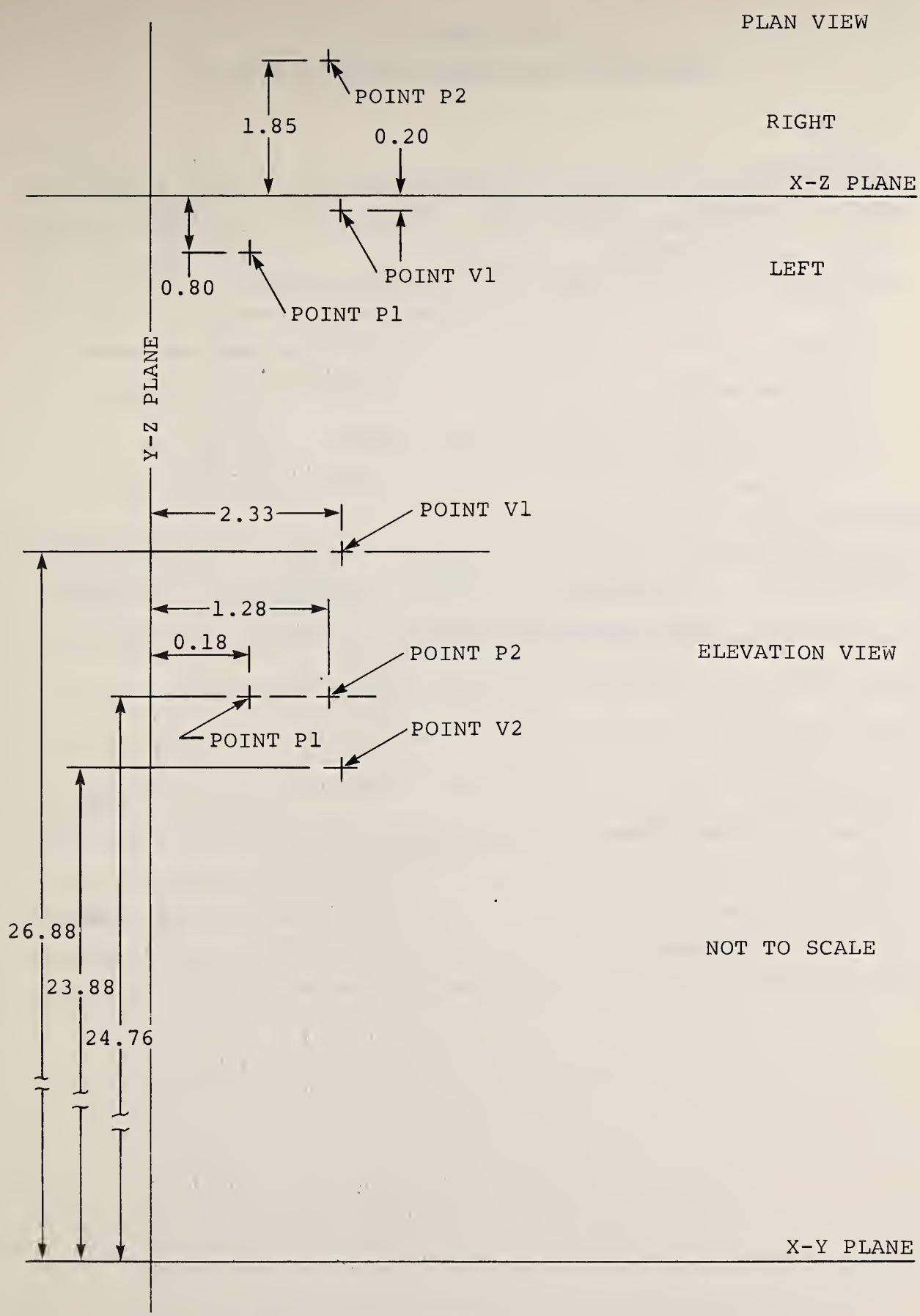
For X 44.36 in. to Zero X Plane L31

For Y 15.00 in. to Zero Y Plane W20

For Z 10.85 in. to Zero Z Plane H70

MANUFACTURER'S DIMENSIONS FOR VEHICLE ATTITUDE

	From Front Axle Centerline	From Vehicle Centerline	Height Above Ground
Front Station	21.68 in.	±26.38 in.	7.69 in.
Rear Station	81.26 in.	±26.22 in.	5.56 in.
SRP	56.36 in.	15.00 in.	17.01 in.
"R" Point	56.36 in.	15.00 in.	17.01 in.



Relationship of Reference Points –
1978 AMC Concord 2-Door D/L Coupe.

DATA SHEET 2

MONOCULAR OBSTRUCTION ANGLE FROM V_1

VEHICLE:

MANUFACTURER American Motors YEAR 1978

MODEL Concord BODY STYLE 2 Door

VIN A8A067L399954

LOCATION OF "V" POINT RELATIVE TO THE "R" Point

	V_1	V_2
X	2.33	2.33
Y	-0.20	-0.20
Z	26.88	23.88

OBSTRUCTIONS: Zone I

Elevation	Obstruction	Left Angle	Right Angle	Obstruction Angle
V_1	Left A Pillar	324°41'	335°17'	10°36'

Total 10°36'

Explanations Pertinent to the Specific Measurements:

DATA SHEET 2

MONOCULAR OBSTRUCTION ANGLE FROM V_1

VEHICLE:

MANUFACTURER American Motors YEAR 1978

MODEL Concord BODY STYLE 2 Door

VIN A8A067L399954

LOCATION OF "V" POINT RELATIVE TO THE "R" Point

	V_1	V_2
X	2.33	2.33
Y	-0.20	-0.20
Z	26.88	23.88

OBSTRUCTIONS: Zone II

Elevation	Obstruction	Left Angle	Right Angle	Obstruction Angle
V_1	Rear View Mirror	27°22'	54°18'	26°56'
	Right A Pillar	64°06'	70°46'	6°40'

Total 33°36'

Explanations Pertinent to the Specific Measurements:

DATA SHEET 2

MONOCULAR OBSTRUCTION ANGLE FROM V_1

VEHICLE:

MANUFACTURER American Motors YEAR 1978

MODEL Concord BODY STYLE 2 Door

VIN A8A067L399954

LOCATION OF "V" POINT RELATIVE TO THE "R" Point

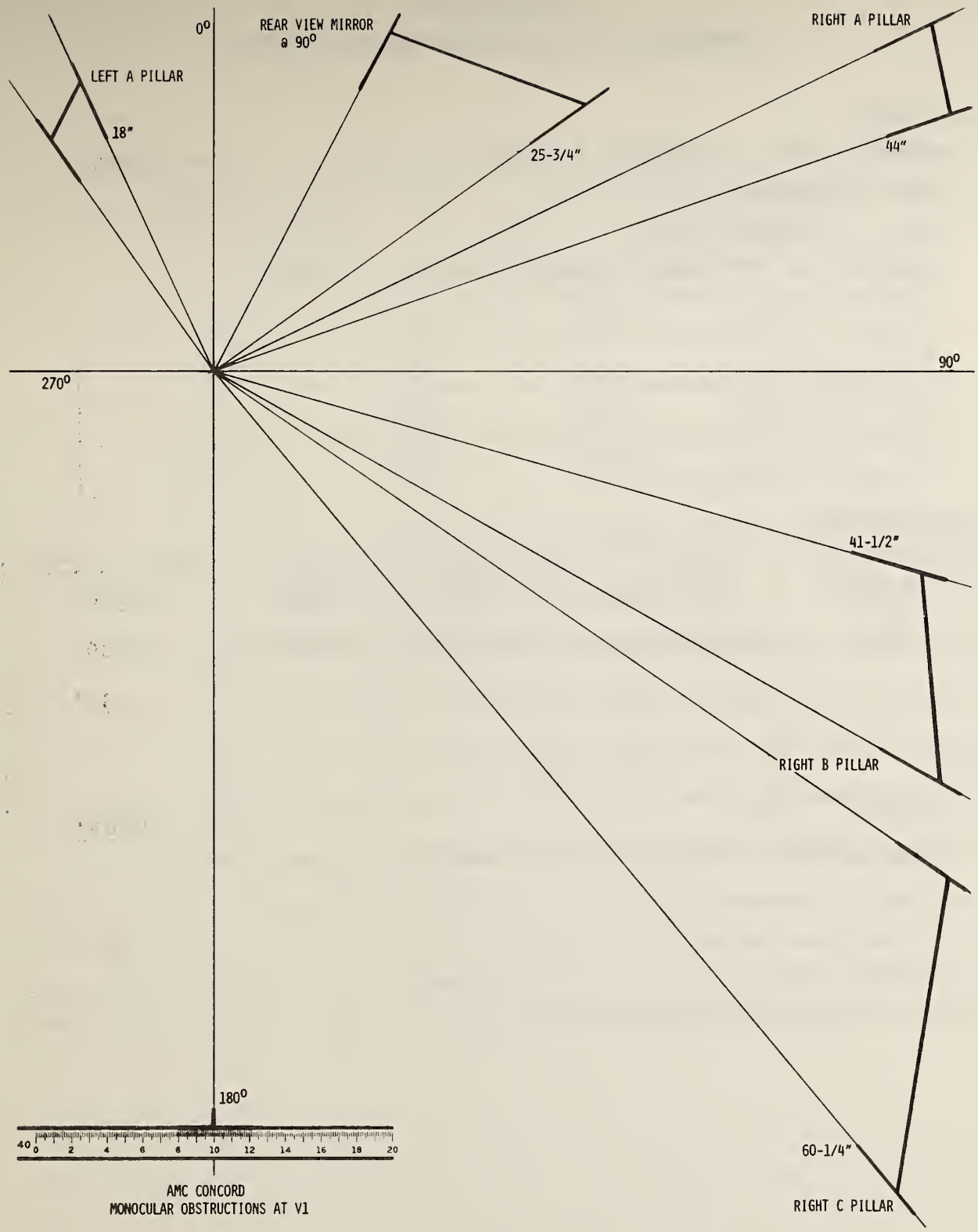
	V_1	V_2
X	2.33	2.33
Y	-0.20	-0.20
Z	26.88	23.88

OBSTRUCTIONS: Zone IV

Elevation	Obstruction	Left Angle	Right Angle	Obstruction Angle
V_1	Right B Pillar	105°54'	119°24'	13°30'
	Right C Pillar	124°36'	140°14'	15°38'

Total 29°08'

Explanations Pertinent to the Specific Measurements:



Plan View of Monocular Obstructions at V_1 - AMC Concord.

DATA SHEET 2

MONOCULAR OBSTRUCTION ANGLE FROM V_2

VEHICLE:

MANUFACTURER American Motors YEAR 1978

MODEL Concord BODY STYLE 2 Door

VIN A8A067L399954

LOCATION OF "V" POINT RELATIVE TO THE "R" Point

	V_1	V_2
X	2.33	2.33
Y	-0.20	-0.20
Z	26.88	23.88

OBSTRUCTIONS: Zone I

Elevation	Obstruction	Left Angle	Right Angle	Obstruction Angle
V_2	Left A Pillar	327°55'	336°31'	8°36'

Total 8°36'

Explanations Pertinent to the Specific Measurements:

DATA SHEET 2

MONOCULAR OBSTRUCTION ANGLE FROM V_2

VEHICLE:

MANUFACTURER American Motors YEAR 1978

MODEL Concord BODY STYLE 2 Door

VIN A8A067L399954

LOCATION OF "V" POINT RELATIVE TO THE "R" Point

	V_1	V_2
X	2.33	2.33
Y	-0.20	-0.20
Z	26.88	23.88

OBSTRUCTIONS: Zone II

Elevation	Obstruction	Left Angle	Right Angle	Obstruction Angle
V_2	Right A Pillar	59°56'	66°23'	6°27'

Total 6°27'

Explanations Pertinent to the Specific Measurements:

DATA SHEET 2

MONOCULAR OBSTRUCTION ANGLE FROM V_2

VEHICLE:

MANUFACTURER American Motors YEAR 1978

MODEL Concord BODY STYLE 2 Door

VIN A8A067L399954

LOCATION OF "V" POINT RELATIVE TO THE "R" Point

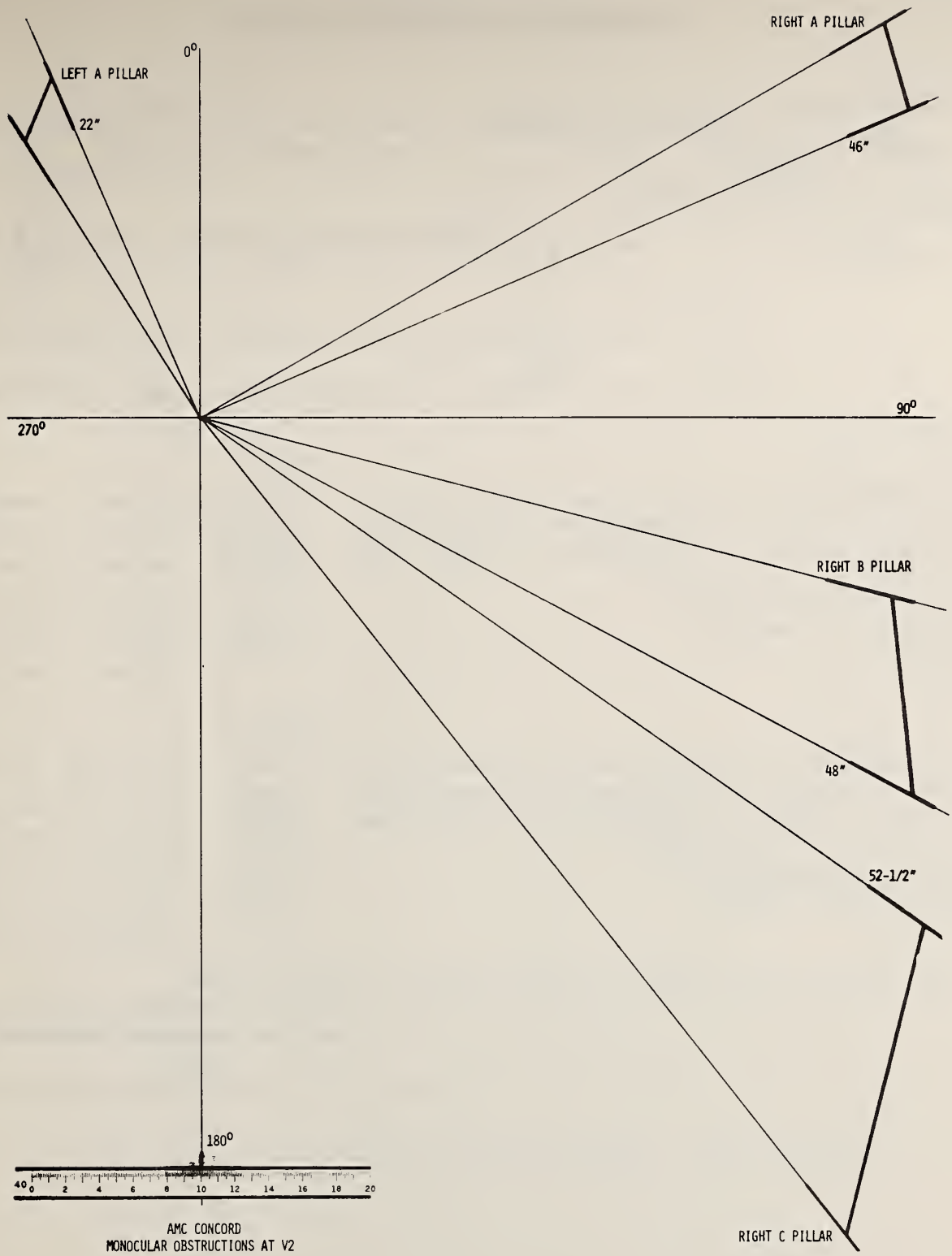
	V_1	V_2
X	2.33	2.33
Y	-0.20	-0.20
Z	26.88	23.88

OBSTRUCTIONS: Zone IV

Elevation	Obstruction	Left Angle	Right Angle	Obstruction Angle
V_2	Right B Pillar	104°29'	118°01'	13°32'
	Right C Pillar	125°08'	141°47'	16°39'

Total 30°11'

Explanations Pertinent to the Specific Measurements:



Plan View of Monocular Obstructions at V_2 - AMC Concord.

DATA SHEET 4

BINOCULAR OBSTRUCTION ANGLES

VEHICLE:

MANUFACTURER American Motors YEAR 1978

MODEL Concord BODY STYLE 2 Door

VIN A8A067L399954

	Dimensions Relative to "R" Point		
	X	Y	Z
P_1	0.18	-0.80	24.76
P_2	1.28	+1.85	24.76

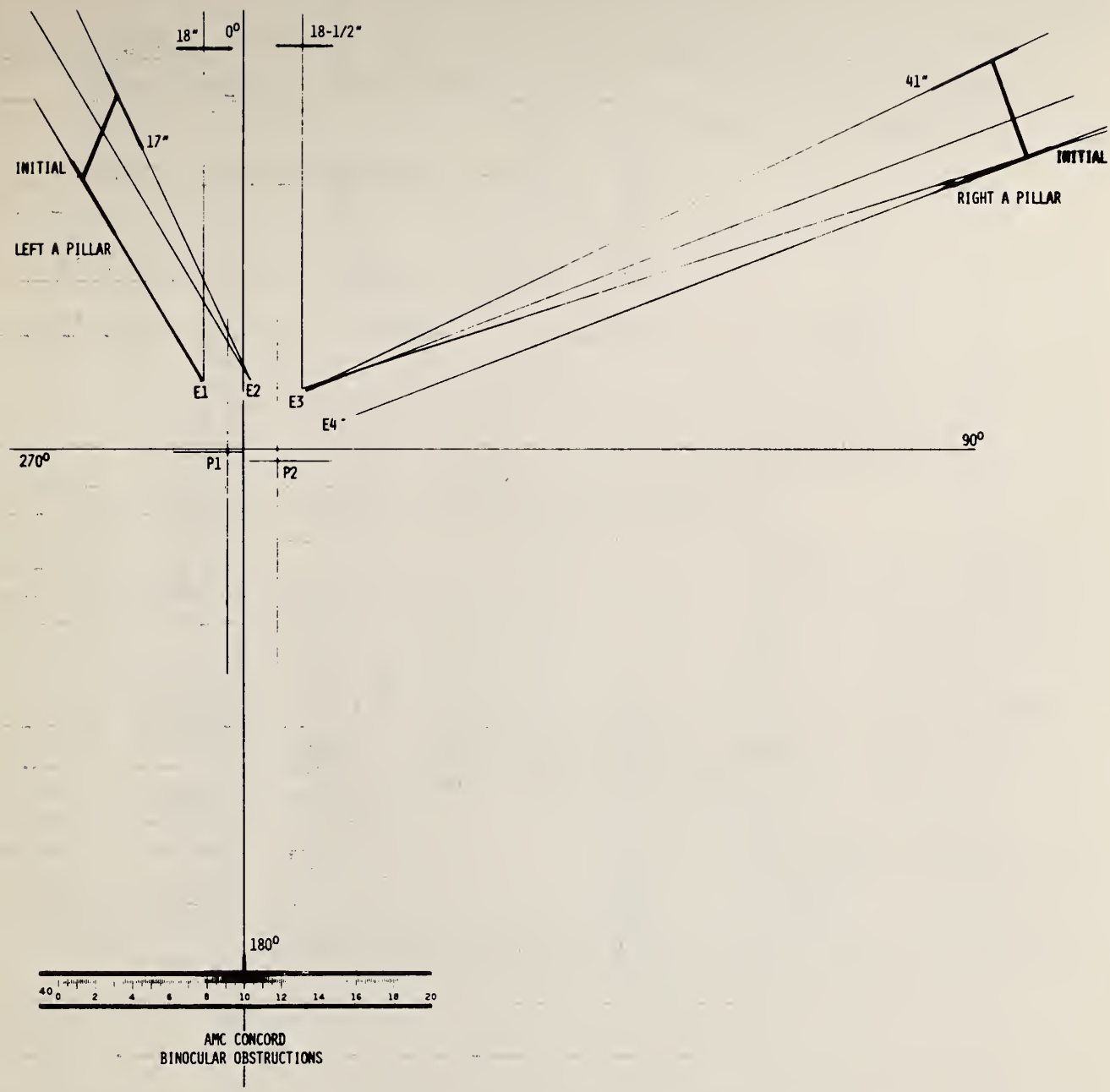
Zone: I

Obstruction	Left A Pillar		
Initial Sight to Outboard E - Rear Side	328°38'		
Adjusted Sight to Outboard E - Rear Side	330°06'		
Inboard E - Front Side	335°47'		
Angle to Bench Mark			
Obstruction Angle	5°41'		
Azimuth			

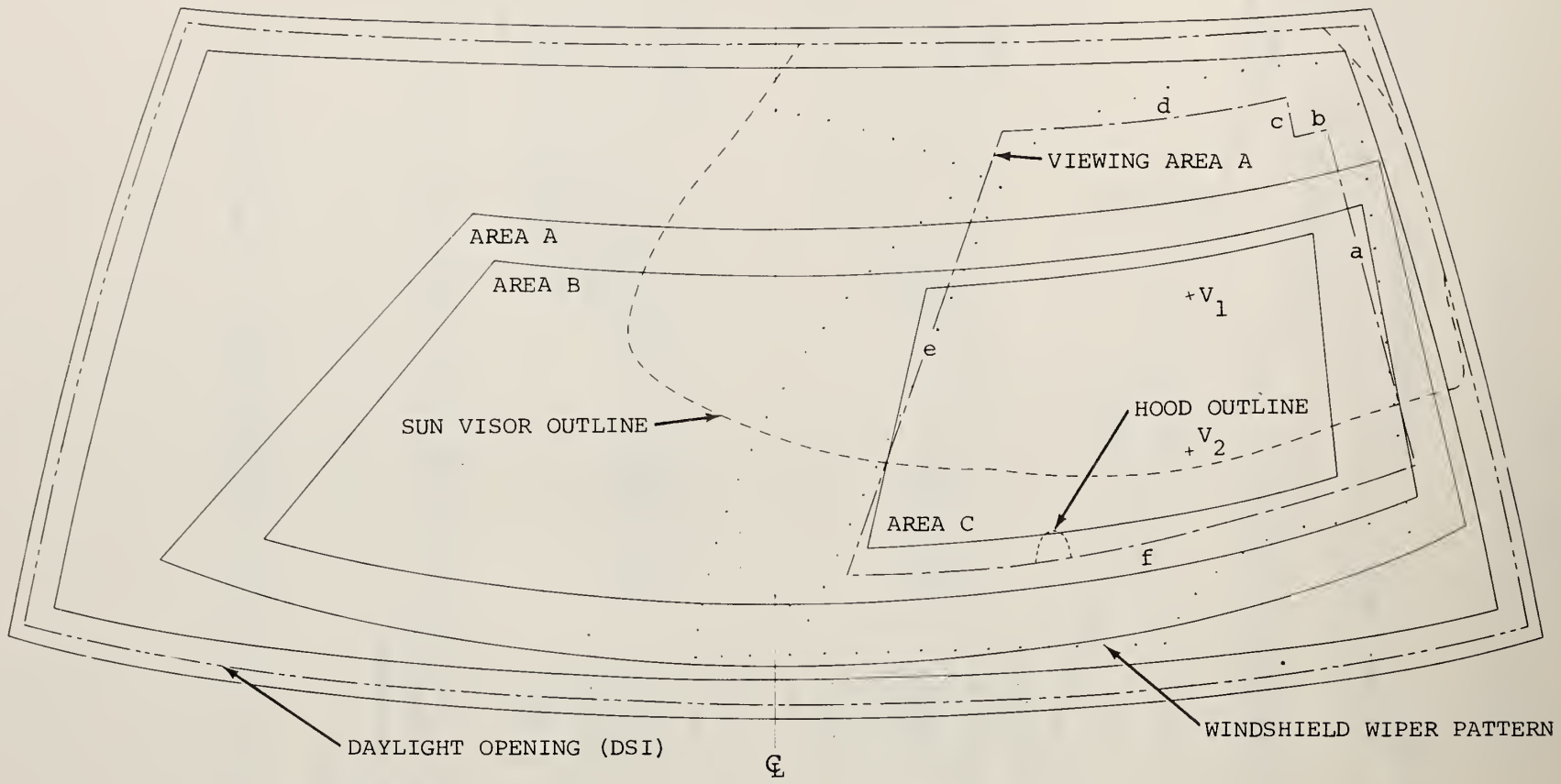
Zone: II

Obstruction	Right A Pillar		
Initial Sight to Outboard E - Rear Side	72°05'		
Adjusted Sight to Outboard E - Rear Side	29°22'		
Inboard E - Front Side	25°09'		
Angle to Bench Mark			
Obstruction Angle	4°13'		
Azimuth			

Explanations Pertinent to the Specific Measurements:



Plan View of Binocular Obstructions - AMC Concord.



Windshield Overlay Showing Relationship Between Critical Areas per FMVSS 104 and View Area A as Measured for This Vehicle - AMC Concord.

DATA SHEET 3

WINDSHIELD AREAS

VEHICLE:

MANUFACTURER American Motors YEAR 1978

MODEL Concord BODY STYLE 2 Door

VIN A8A067L399954

VIEW AREA DIMENSIONAL MEASUREMENTS

Relative to Windshield Points

"A" Pillar to Side a 2.93

"A" Pillar to Side c 3.74

DLO Top of Windshield to Side d 3.13

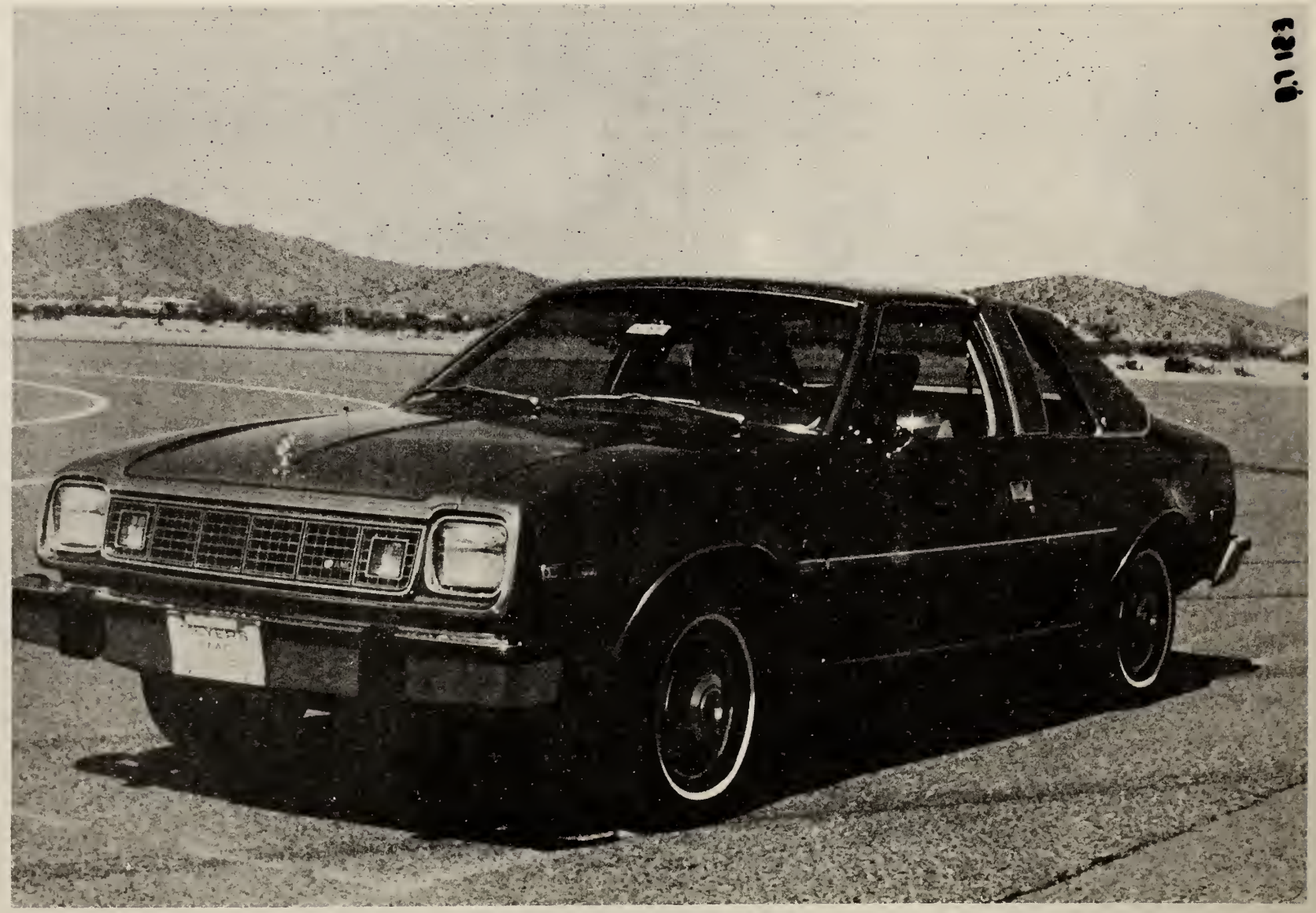
DLO Bottom of Windshield to Side f 5.57

Relative to Critical A, B, C Areas

	A	B	C
Side a Leftward to	1.31	-.17	-2.98
Side c Leftward to	2.97	2.03	-.02
Side e Rightward to	18.91	17.47	.81
Side d Upward to	-3.25	-4.95	-5.55
Side f Downward to	3.38	1.08	-.91

Critical Areas (A, B, C) Relative to Windshield Points

	A	B	C
"A" Pillar to	1.64	3.16	5.93
DLO Top of Windshield to	6.39	8.07	8.65
DLO Bottom of Windshield to	1.06	4.50	6.50



Left Front Three-Quarter View - 1978 AMC Concord 2-Door D/L Coupe.

Right Rear Three-Quarter View - 1978 AMC Concord 2-Door D/L Coupe.

APPENDIX E2 - AMC GREMLIN

DATA SHEET NO. 1 - VEHICLE DATA

VEHICLE:

MANUFACTURER American Motors YEAR 1978

MODEL Gremlin BODY STYLE 2 Door

VIN A8A467C311156 ODOMETER 12,363

BUILD DATE 8/77

SPECIAL OPTIONS

FRONT SEAT TYPE: SPECIFIED Bench

TILT STEERING WHEEL? YES ____ NO X

FRONT SEAT TRAVEL RANGE: SPECIFIED 4.88 in.

FRONT SEAT BACK ANGLE: SPECIFIED 26°

MEASURING POINT CORRECTIONS

	X (in.)	Z (in.)
P From Table 2	-0.88	--
P From Table 3	+0.34	-0.10
Total P	-0.54	
V From Table 3	+0.34	-0.10

MANUFACTURER'S REFERENCE POINTS FOR SRP

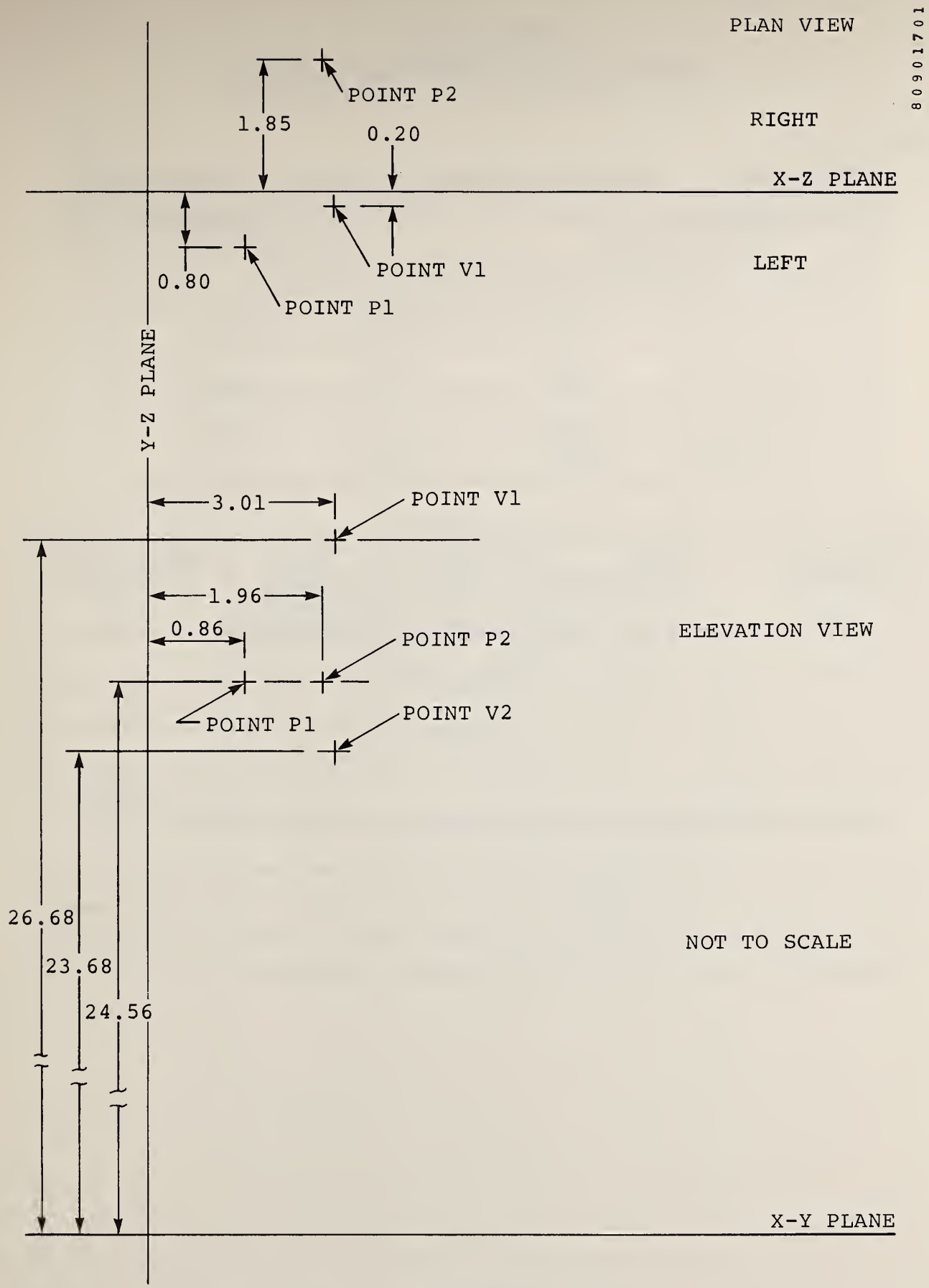
For X 44.36 in. to Zero X Plane L31

For Y 15.00 in. to Zero Y Plane W20

For Z 10.85 in. to Zero Z Plane H70

MANUFACTURER'S DIMENSIONS FOR VEHICLE ATTITUDE

	From Front Axle Centerline	From Vehicle Centerline	Height Above Ground
Front Station	21.68 in.	±26.40 in.	7.71 in.
Rear Station	76.24 in.	±26.29 in.	5.36 in.
SRP	56.36 in.	15.00 in.	16.84 in.
"R" Point	56.36 in.	15.00 in.	16.84 in.



Relationship of Reference Points -
1978 AMC Gremlin 2-Door Custom.

DATA SHEET 2

MONOCULAR OBSTRUCTION ANGLE FROM V_1

VEHICLE:

MANUFACTURER American Motors YEAR 1978

MODEL Gremlin BODY STYLE 2 Door

VIN A8A467C311156

LOCATION OF "V" POINT RELATIVE TO THE "R" Point

	V_1	V_2
X	3.01	3.01
Y	-0.20	-0.20
Z	26.68	23.68

OBSTRUCTIONS: Zone I

Elevation	Obstruction	Left Angle	Right Angle	Obstruction Angle
V_1	Left A Pillar	325°13'	335°08'	9°55'

Total 9°55'

Explanations Pertinent to the Specific Measurements:

DATA SHEET 2

MONOCULAR OBSTRUCTION ANGLE FROM V_1

VEHICLE:

MANUFACTURER American Motors YEAR 1978

MODEL Gremlin BODY STYLE 2 Door

VIN A8A467C311156

LOCATION OF "V" POINT RELATIVE TO THE "R" Point

	V_1	V_2
X	3.01	3.01
Y	-0.20	-0.20
Z	26.68	23.68

OBSTRUCTIONS: Zone II

Elevation	Obstruction	Left Angle	Right Angle	Obstruction Angle
V_1	Inside Rear View Mirror	28°28'	48°2'	19°34'
	Right A Pillar	62°26'	68°46'	6°20'

Total 25°54'

Explanations Pertinent to the Specific Measurements:

DATA SHEET 2

MONOCULAR OBSTRUCTION ANGLE FROM V_1

VEHICLE:

MANUFACTURER American Motors YEAR 1978

MODEL Gremlin BODY STYLE 2 Door

VIN A8A467C311156

LOCATION OF "V" POINT RELATIVE TO THE "R" Point

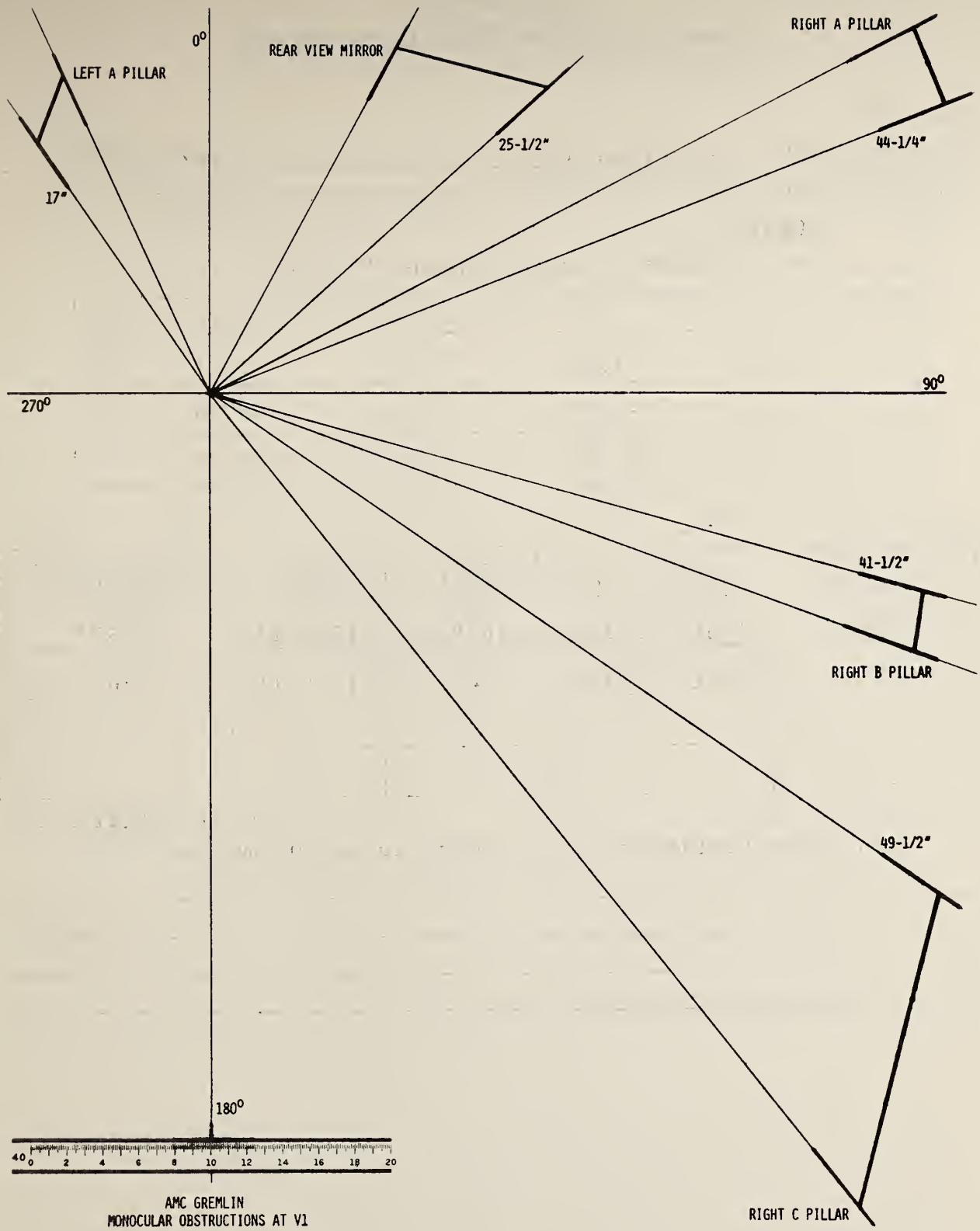
	V_1	V_2
X	3.01	3.01
Y	-0.20	-0.20
Z	26.68	23.68

OBSTRUCTIONS: Zone IV

Elevation	Obstruction	Left Angle	Right Angle	Obstruction Angle
V_1	Right B Pillar	105°24'	110°01'	4°37'
V_1	Right C Pillar	124°21'	141°21'	17°0'

Total 21°37'

Explanations Pertinent to the Specific Measurements:



Plan View of Monocular Obstructions at V_1 - AMC Gremlin.

DATA SHEET 2

MONOCULAR OBSTRUCTION ANGLE FROM V_2

VEHICLE:

MANUFACTURER American Motors YEAR 1978

MODEL Gremlin BODY STYLE 2 Door

VIN A8A467C311156

LOCATION OF "V" POINT RELATIVE TO THE "R" Point

	V_1	V_2
X	3.01	3.01
Y	-0.20	-0.20
Z	26.68	23.68

OBSTRUCTIONS: Zone I

Elevation	Obstruction	Left Angle	Right Angle	Obstruction Angle
V_2	Left A Pillar	328°20'	336°33'	8°13'

Total 8°13'

Explanations Pertinent to the Specific Measurements:

DATA SHEET 2

MONOCULAR OBSTRUCTION ANGLE FROM V_2

VEHICLE:

MANUFACTURER American Motors YEAR 1978

MODEL Gremlin BODY STYLE 2 Door

VIN A8A467C311156

LOCATION OF "V" POINT RELATIVE TO THE "R" Point

	V_1	V_2
X	3.01	3.01
Y	-0.20	-0.20
Z	26.68	23.68

OBSTRUCTIONS: Zone II

Elevation	Obstruction	Left Angle	Right Angle	Obstruction Angle
V2	Right A Pillar	58°40'	64°38'	5°58'

Total 5°58'

Explanations Pertinent to the Specific Measurements:

DATA SHEET 2

MONOCULAR OBSTRUCTION ANGLE FROM V_2

VEHICLE:

MANUFACTURER American Motors YEAR 1978

MODEL Gremlin BODY STYLE 2 Door

VIN A8A467C311156

LOCATION OF "V" POINT RELATIVE TO THE "R" Point

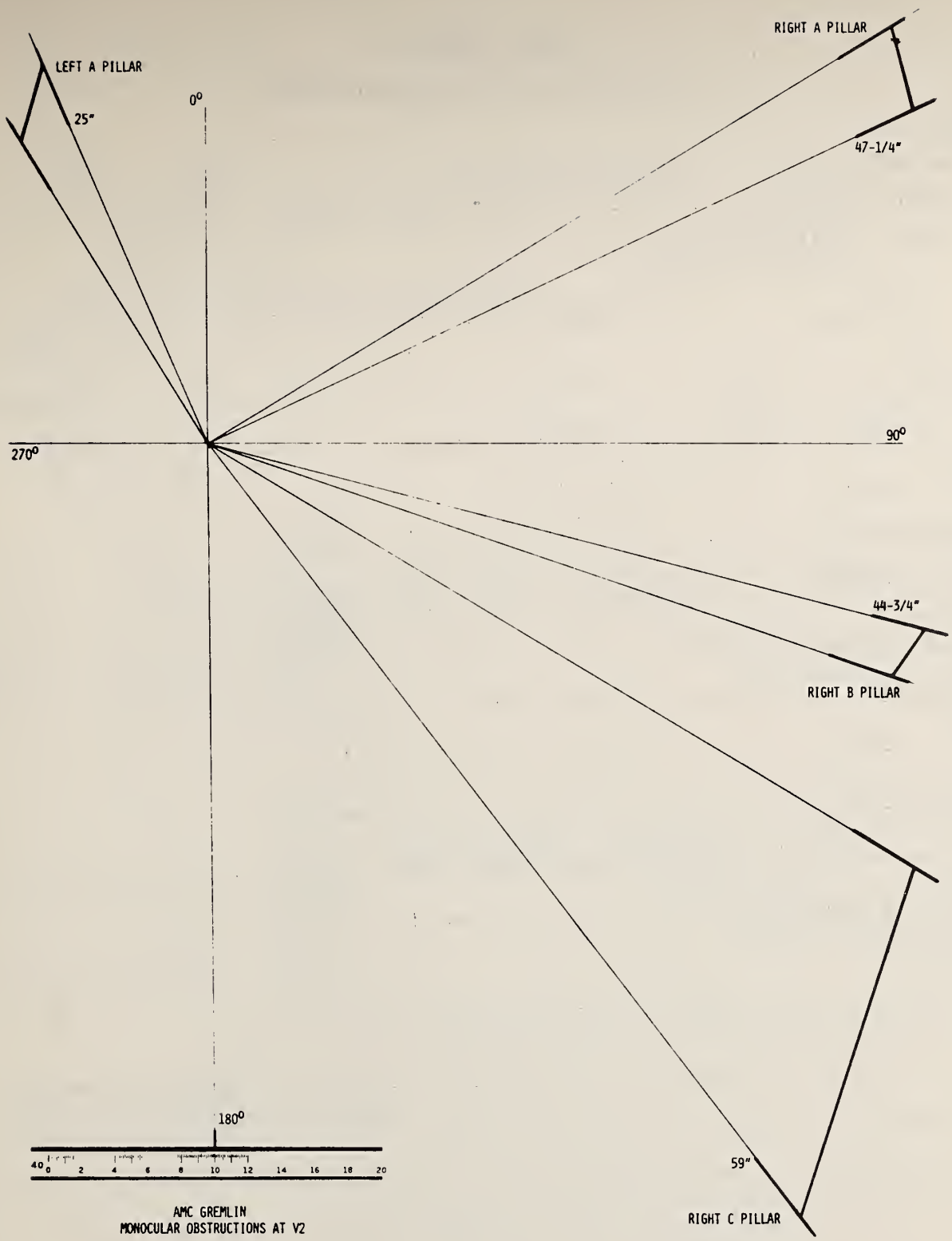
	V_1	V_2
X	3.01	3.01
Y	-0.20	-0.20
Z	26.68	23.68

OBSTRUCTIONS: Zone IV

Elevation	Obstruction	Left Angle	Right Angle	Obstruction Angle
V_2	Right B Pillar	104°29'	108°55'	4°26'
V_2	Right C Pillar	121°03'	142°35'	21°32'

Total 25°58'

Explanations Pertinent to the Specific Measurements:



Plan View of Monocular Obstructions at V_2 - AMC Gremlin.

DATA SHEET 4

BINOCULAR OBSTRUCTION ANGLES

VEHICLE:

MANUFACTURER American Motors YEAR 1978

MODEL Gremlin BODY STYLE 2 Door

VIN A8A467C311156

	Dimensions Relative to "R" Point		
	X	Y	Z
P_1	0.86	0.80	24.56
P_2	1.96	1.85	24.56

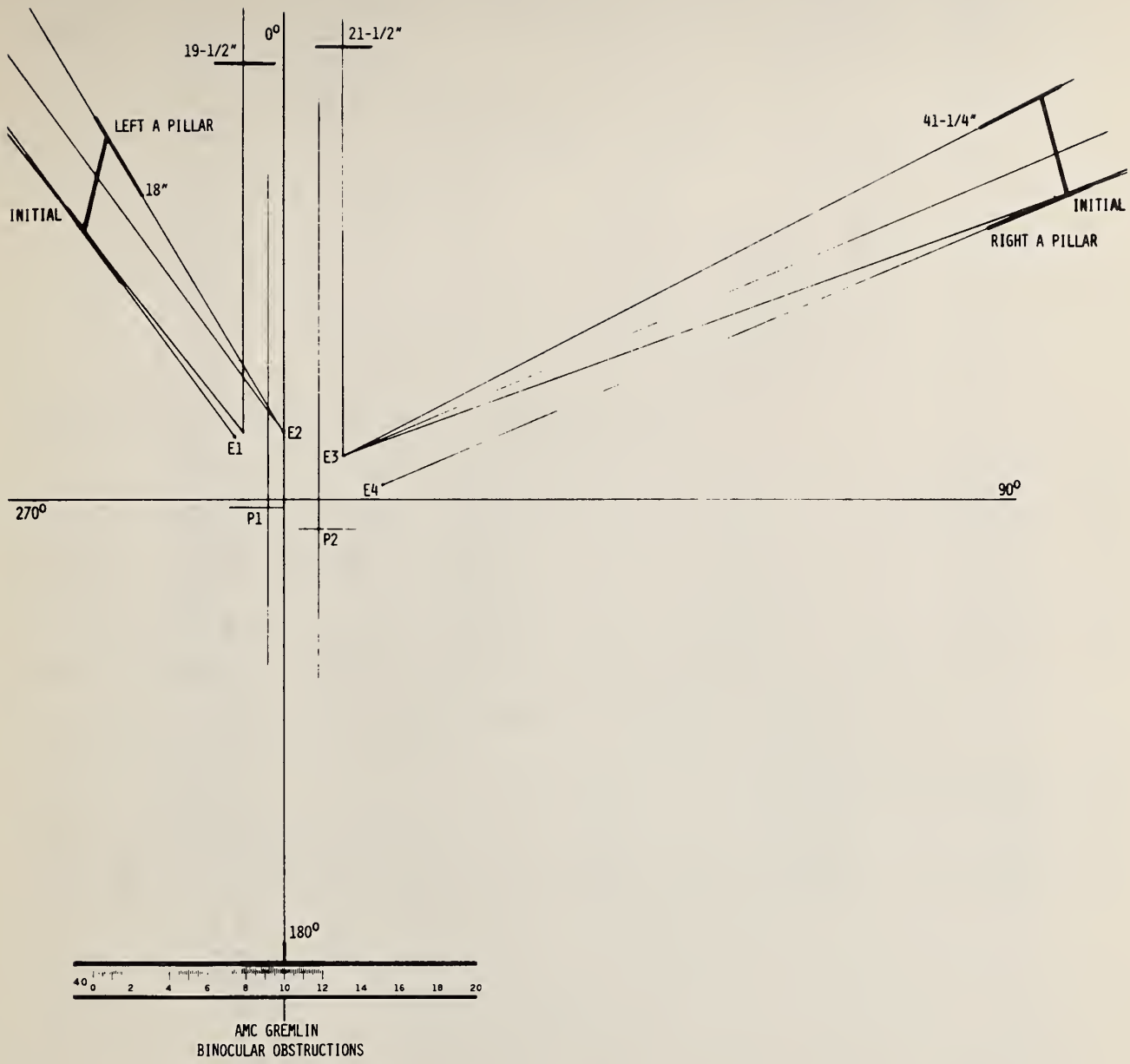
Zone: I

Obstruction	Left A Pillar		
Initial Sight to Outboard E - Rear Side	321°48'		
Adjusted Sight to Outboard E - Rear Side	330°03'		
Inboard E - Front Side	335°15'		
Angle to Bench Mark			
Obstruction Angle	5°12'		
Azimuth			

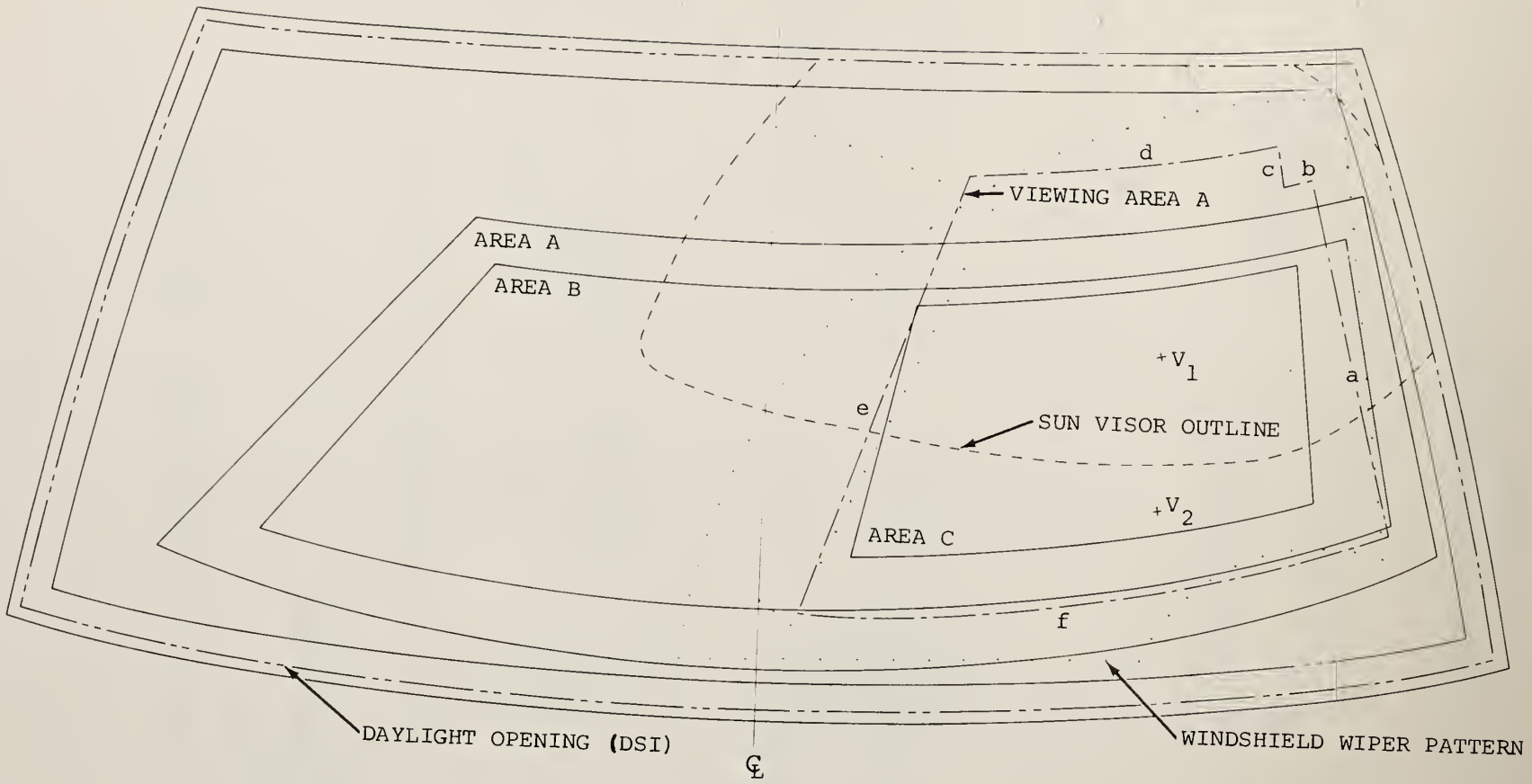
Zone: II

Obstruction	Right A Pillar		
Initial Sight to Outboard E - Rear Side	70°0'		
Adjusted Sight to Outboard E - Rear Side	30°34'		
Inboard E - Front Side	25°39'		
Angle to Bench Mark			
Obstruction Angle	5°05'		
Azimuth			

Explanations Pertinent to the Specific Measurements:



Plan View of Binocular Obstructions - AMC Gremlin.



Windshield Overlay Showing Relationship Between Critical Areas per FMVSS 104 and View Area A as Measured for This Vehicle - AMC Gremlin.

DATA SHEET 3

WINDSHIELD AREAS

VEHICLE:

MANUFACTURER American Motors YEAR 1978

MODEL Gremlin BODY STYLE 2 Door

VIN A8A467C311156

VIEW AREA DIMENSIONAL MEASUREMENTS

Relative to Windshield Points

"A" Pillar to Side a 3.23

"A" Pillar to Side c 3.78

DLO Top of Windshield to Side d 3.98

DLO Bottom of Windshield to Side f 4.09

Relative to Critical A, B, C Areas

	A	B	C
Side a Leftward to	1.27	0.19	-2.58
Side c Leftward to	2.84	2.03	0.39
Side e Rightward to	18.18	16.75	0.06
Side d Upward to	-2.60	-4.29	-4.91
Side f Downward to	1.93	-0.35	-2.35

Critical Areas (A, B, C) Relative to Windshield Points

	A	B	C
"A" Pillar to	1.96	3.26	5.89
DLO Top of Windshield to	6.58	8.27	8.89
DLO Bottom of Windshield to	2.16	4.44	6.44

Left Front Three-Quarter View - 1978 AMC Gremlin 2-Door Custom.

Right Rear Three-Quarter View - 1978 AMC Gremlin 2-Door Custom.

APPENDIX E3 - AMC PACER

DATA SHEET NO. 1 - VEHICLE DATA

VEHICLE:

MANUFACTURER American Motors YEAR 1978

MODEL Pacer BODY STYLE 2 Door

VIN A8C667H336934 ODOMETER 4761

BUILD DATE 10/77

SPECIAL OPTIONS

FRONT SEAT TYPE: SPECIFIED Bucket

TILT STEERING WHEEL? YES X NO

FRONT SEAT TRAVEL RANGE: SPECIFIED 4.88 in.

FRONT SEAT BACK ANGLE: SPECIFIED 24°

MEASURING POINT CORRECTIONS

	X (in.)	Z (in.)
P From Table 2	-0.88	--
P From Table 3	-0.34	+0.10
Total P	-1.22	+0.10
V From Table 3	-0.34	+0.10

MANUFACTURER'S REFERENCE POINTS FOR SRP

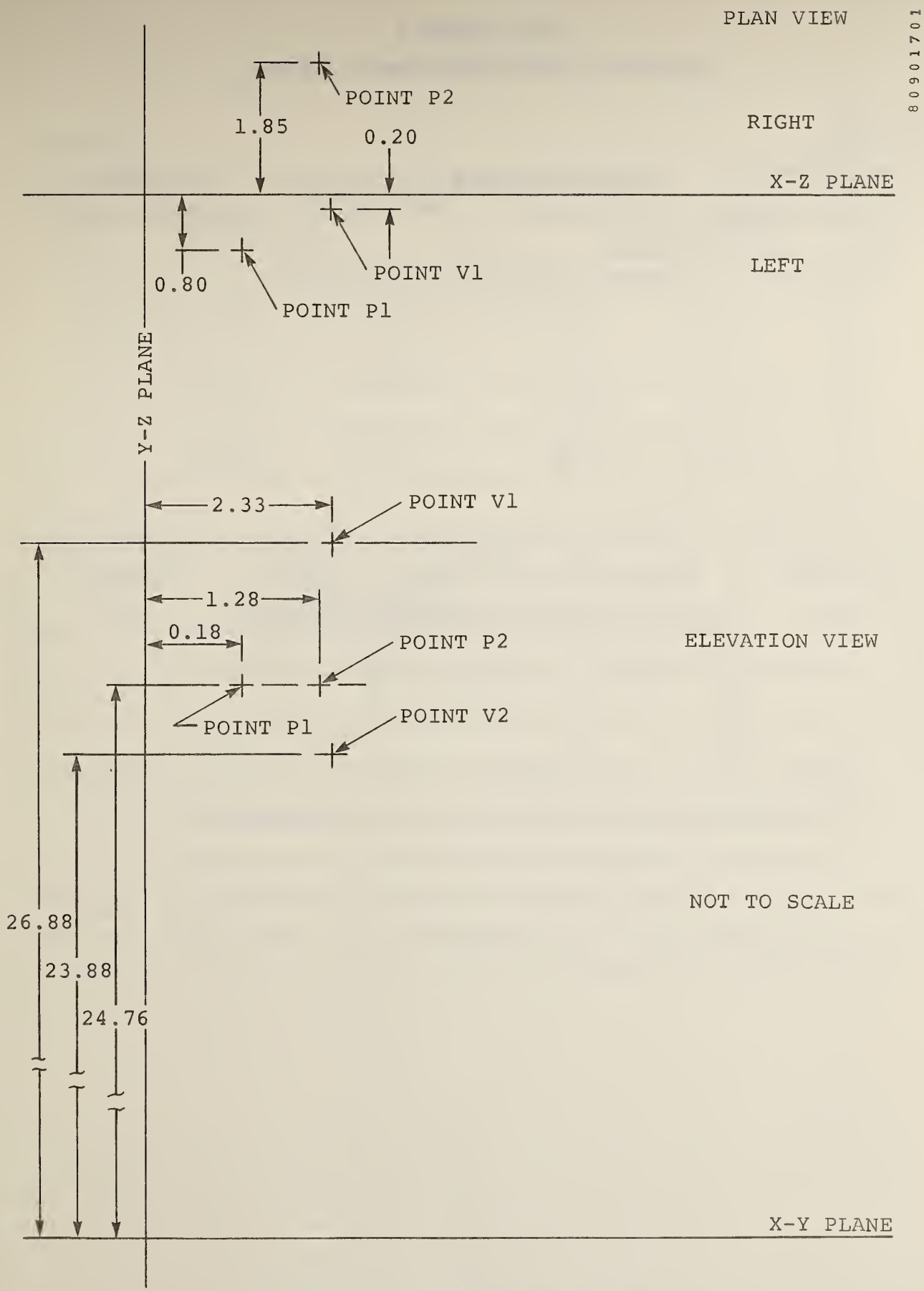
For X 45.23 in. to Zero X Plane L31

For Y 15.00 in. to Zero Y Plane W20

For Z 13.10 in. to Zero Z Plane H70

MANUFACTURER'S DIMENSIONS FOR VEHICLE ATTITUDE

	From Front Axle Centerline	From Vehicle Centerline	Height Above Ground
Front Station	24.34 in.	±29.88 in.	7.63 in.
Rear Station	75.65 in.	±29.88 in.	6.00 in.
SRP	59.23 in.	15.00 in.	17.83 in.
"R" Point	59.23 in.	15.94 in.	17.83 in.



Relationship of Reference Points -
1978 AMC Pacer 2-Door D/L Coupe.

DATA SHEET 2

MONOCULAR OBSTRUCTION ANGLE FROM V_1

VEHICLE:

MANUFACTURER American Motors YEAR 1978

MODEL Pacer BODY STYLE 2 Door

VIN A8C667H336934

LOCATION OF "V" POINT RELATIVE TO THE "R" Point

	V_1	V_2
X	2.33	2.33
Y	-0.20	-0.20
Z	26.88	23.88

OBSTRUCTIONS: Zone I

Elevation	Obstruction	Left Angle	Right Angle	Obstruction Angle
V_1	Left A Pillar	326°51'	336°22'	9°31'

Total 9°31'

Explanations Pertinent to the Specific Measurements:

DATA SHEET 2

MONOCULAR OBSTRUCTION ANGLE FROM V_1

VEHICLE:

MANUFACTURER American Motors YEAR 1978

MODEL Pacer BODY STYLE 2 Door

VIN A8C667H336934

LOCATION OF "V" POINT RELATIVE TO THE "R" Point

	V_1	V_2
X	2.33	2.33
Y	-0.20	-0.20
Z	26.88	23.88

OBSTRUCTIONS: Zone II

Elevation	Obstruction	Left Angle	Right Angle	Obstruction Angle
V_1	Adjustment Tab on Mirror Bottom	34°07'	35°26'	1°19'
	Right A Pillar	63°13'	68°54'	5°41'

Total 7°00'

Explanations Pertinent to the Specific Measurements:

DATA SHEET 2

MONOCULAR OBSTRUCTION ANGLE FROM V_1

VEHICLE:

MANUFACTURER American Motors YEAR 1978

MODEL Pacer BODY STYLE 2 Door

VIN A8C667H336934

LOCATION OF "V" POINT RELATIVE TO THE "R" Point

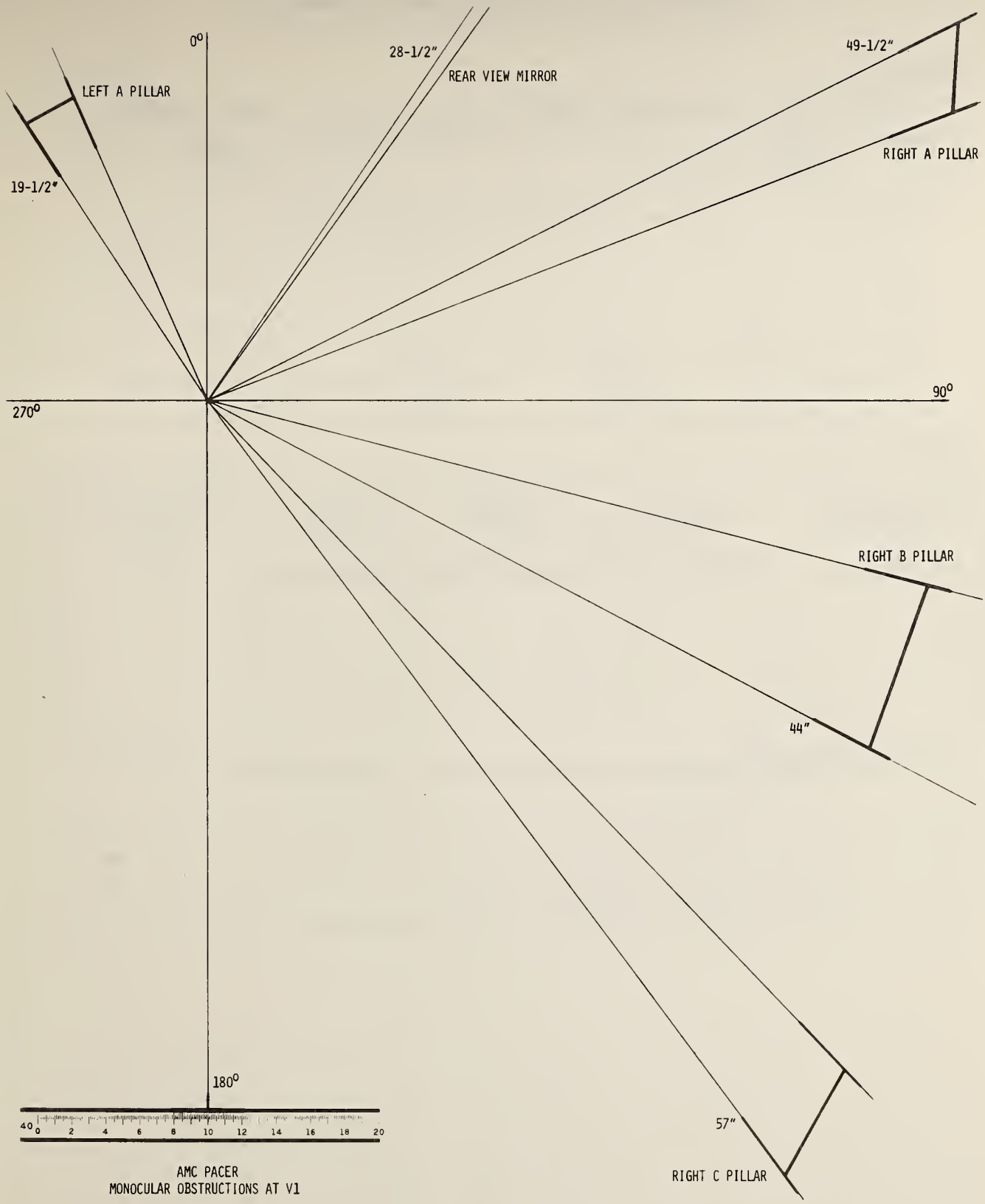
	V_1	V_2
X	2.33	2.33
Y	-0.20	-0.20
Z	26.88	23.88

OBSTRUCTIONS: Zone IV

Elevation	Obstruction	Left Angle	Right Angle	Obstruction Angle
V_1	Right B Pillar	104°24'	117°53'	13°29'
	Right C Pillar	136°26'	143°22'	6°56'

Total 20°25'

Explanations Pertinent to the Specific Measurements:



Plan View of Monocular Obstructions at V_1 - AMC Pacer.

DATA SHEET 2

MONOCULAR OBSTRUCTION ANGLE FROM V_2

VEHICLE:

MANUFACTURER American Motors YEAR 1978

MODEL Pacer BODY STYLE 2 Door

VIN A8C667H336934

LOCATION OF "V" POINT RELATIVE TO THE "R" Point

	V_1	V_2
X	2.33	2.33
Y	-0.20	-0.20
Z	26.88	23.88

OBSTRUCTIONS: Zone I

Elevation	Obstruction	Left Angle	Right Angle	Obstruction Angle
V_2	Left A Pillar	328°10'	335°59'	7°49'

Total 7°49'

Explanations Pertinent to the Specific Measurements:

DATA SHEET 2

MONOCULAR OBSTRUCTION ANGLE FROM V_2

VEHICLE:

MANUFACTURER American Motors YEAR 1978

MODEL Pacer BODY STYLE 2 Door

VIN A8C667H336934

LOCATION OF "V" POINT RELATIVE TO THE "R" Point

	V_1	V_2
X	2.33	2.33
Y	-0.20	-0.20
Z	26.88	23.88

OBSTRUCTIONS: Zone II

Elevation	Obstruction	Left Angle	Right Angle	Obstruction Angle
V_2	Right A Pillar	60°40'	65°39'	4°59'

Total 4°59'

Explanations Pertinent to the Specific Measurements:

DATA SHEET 2

MONOCULAR OBSTRUCTION ANGLE FROM V_2

VEHICLE:

MANUFACTURER American Motors YEAR 1978

MODEL Pacer BODY STYLE 2 Door

VIN A8C667H336934

LOCATION OF "V" POINT RELATIVE TO THE "R" Point

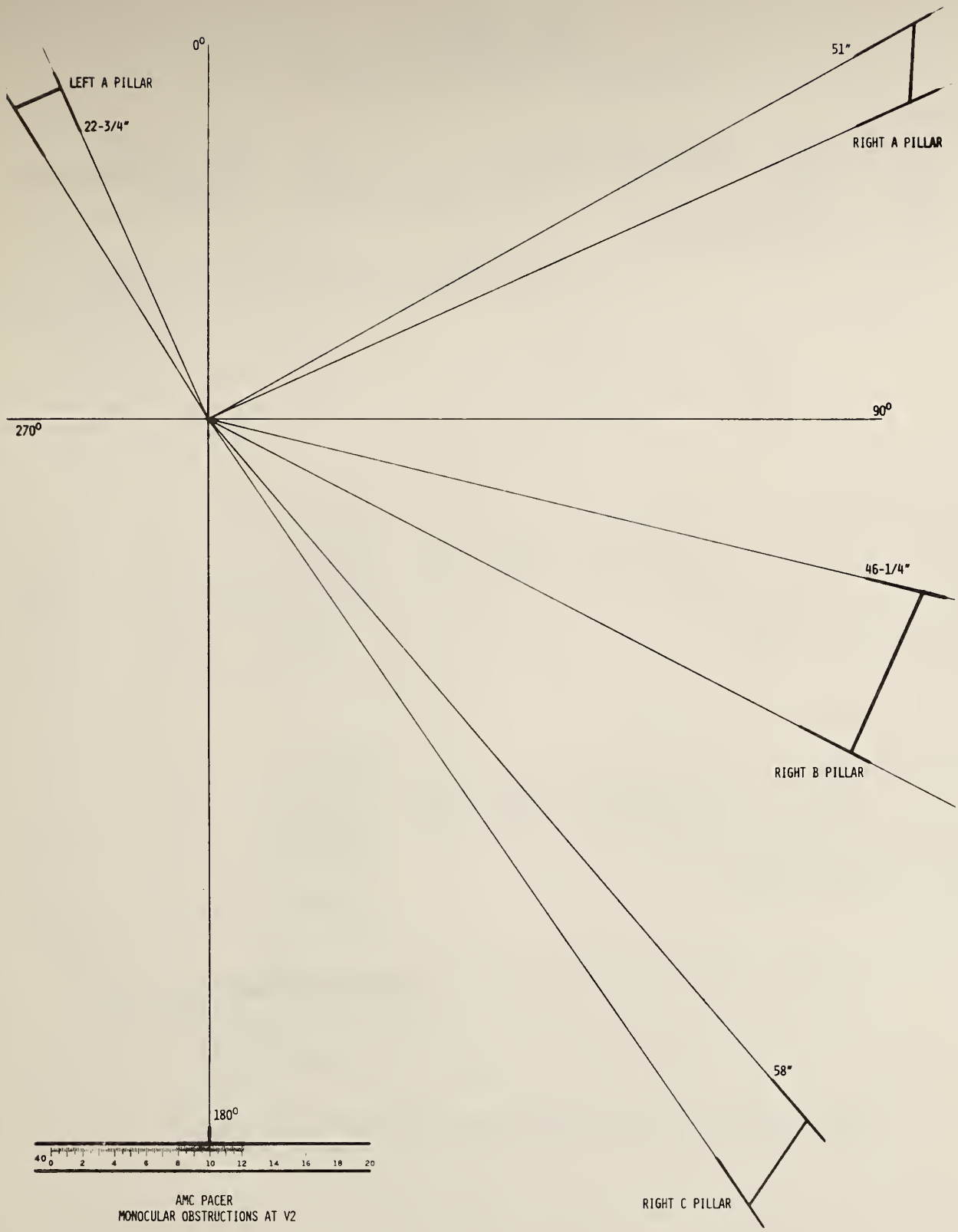
	V_1	V_2
X	2.33	2.33
Y	-0.20	-0.20
Z	26.88	23.88

OBSTRUCTIONS: Zone IV

Elevation	Obstruction	Left Angle	Right Angle	Obstruction Angle
V_2	Right B Pillar	103°43'	117°26'	13°43'
	Right C Pillar	139°45'	145°38'	5°53'

Total 19°36'

Explanations Pertinent to the Specific Measurements:



Plan View of Monocular Obstructions at V_2 - AMC Pacer.

DATA SHEET 4

BINOCULAR OBSTRUCTION ANGLES

VEHICLE:

MANUFACTURER American Motors YEAR 1978

MODEL Pacer BODY STYLE 2 Door

VIN A8C667H336934

	Dimensions Relative to "R" Point		
	X	Y	Z
P_1	0.18	0.80	24.76
P_2	1.28	1.85	24.76

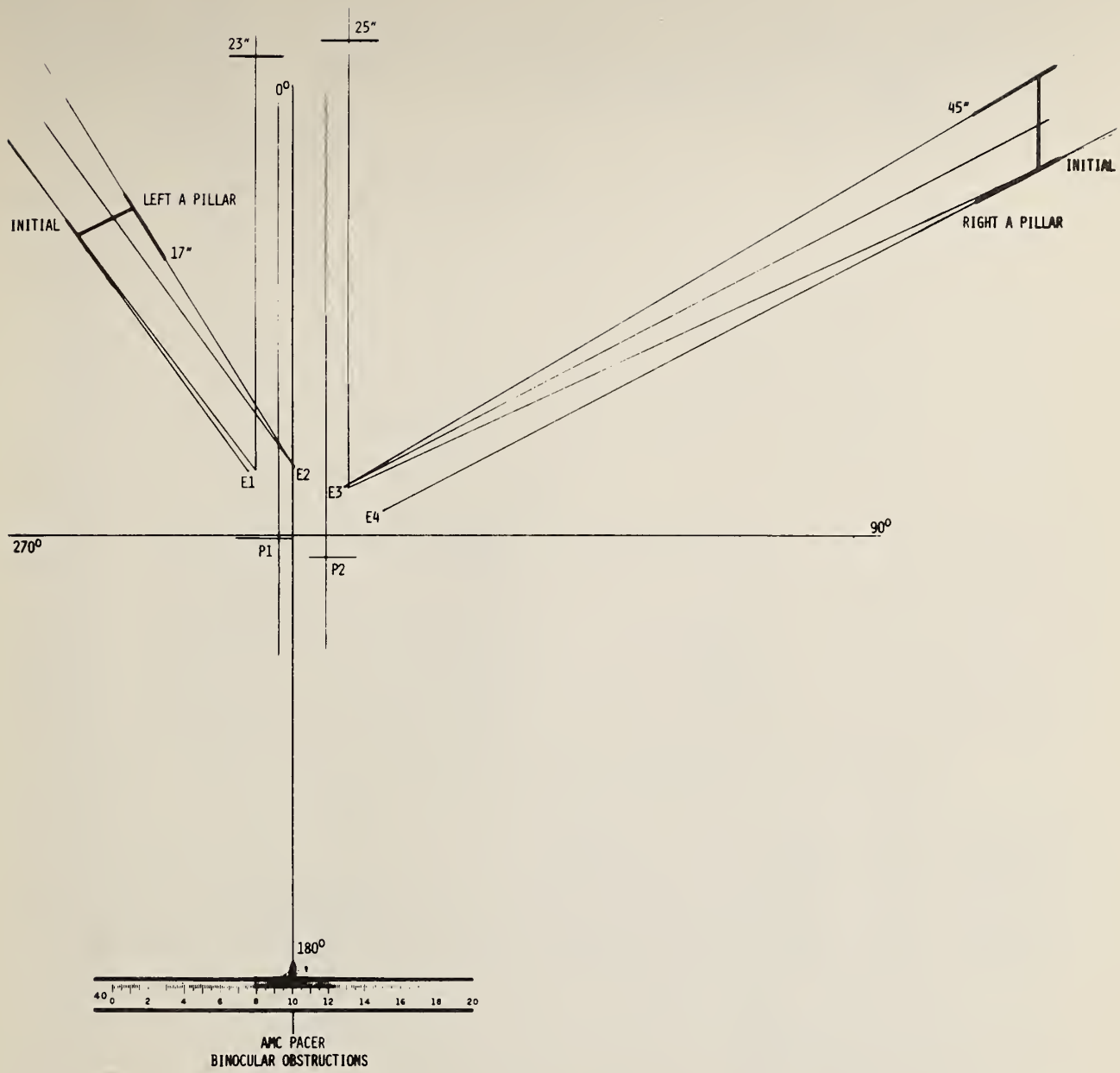
Zone: I

Obstruction	Left A Pillar		
Initial Sight to Outboard E - Rear Side	322°57'		
Adjusted Sight to Outboard E - Rear Side	330°02'		
Inboard E - Front Side	334°00'		
Angle to Bench Mark			
Obstruction Angle	3°58'		
Azimuth			

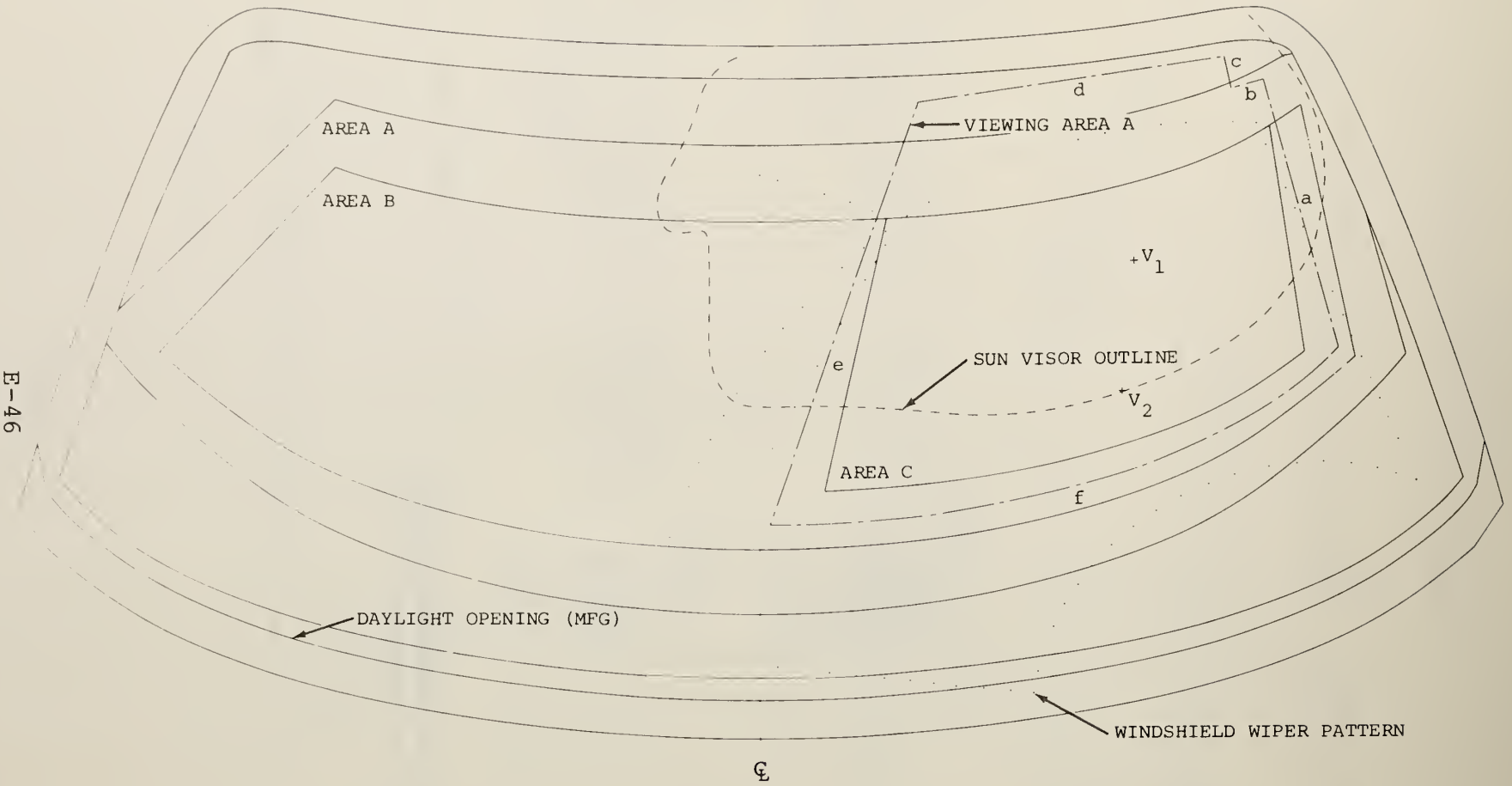
Zone: II

Obstruction	Right A Pillar		
Initial Sight to Outboard E - Rear Side	64°50'		
Adjusted Sight to Outboard E - Rear Side	29°48'		
Inboard E - Front Side	26°46'		
Angle to Bench Mark			
Obstruction Angle	3°02'		
Azimuth			

Explanations Pertinent to the Specific Measurements:



Plan View of Binocular Obstructions - AMC Pacer.



Windshield Overlay Showing Relationship Between Critical Areas per FMVSS 104 and View Area A as Measured for This Vehicle - AMC Pacer.

DATA SHEET 3

WINDSHIELD AREAS

VEHICLE:

MANUFACTURER American Motors YEAR 1978

MODEL Pacer BODY STYLE 2 Door

VIN A8C667H336934

VIEW AREA DIMENSIONAL MEASUREMENTS

Relative to Windshield Points

"A" Pillar to Side a 5.29

"A" Pillar to Side c 4.36

DLO Top of Windshield to Side d 2.19

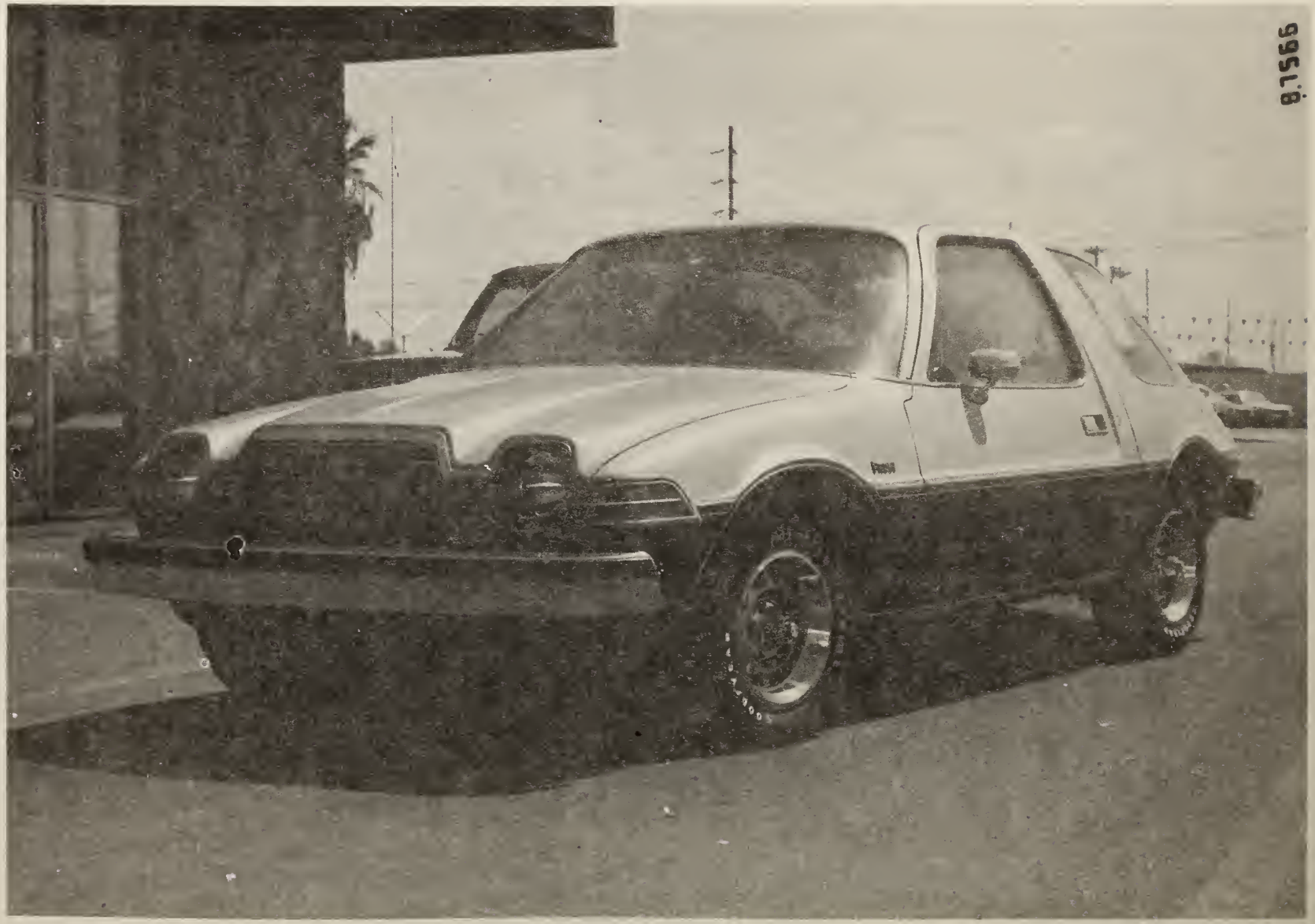
DLO Bottom of Windshield to Side f 8.57

Relative to Critical A, B, C Areas

	A	B	C
Side a Leftward to	3.25	.76	-1.66
Side c Leftward to	4.75	2.94	1.32
Side e Rightward to	27.19	24.98	-.47
Side d Upward to	-2.09	-5.39	-5.39
Side f Downward to	3.95	1.14	-1.30

Critical Areas (A, B, C) Relative to Windshield Points

	A	B	C
"A" Pillar to	2.40	4.64	6.68
DLO Top of Windshield to	4.28	7.58	7.58
DLO Bottom of Windshield to	4.64	7.46	9.89



Left Front Three-Quarter View - 1978 AMC Pacer 2-Door D/L Coupe.

Right Rear Three-Quarter View - 1978 AMC Pacer 2-Door D/L Coupe.

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